PAPER TRADE JOURNAL

Reg. U. S. Pat. Off.

PAPER

SIXTY-FIFTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with PAPER TRADE JOURNAL.

Vol. CIV, No. 11 Thursday, March 18, 1937

Established Sept. 21, 1910
Consolidated Feb. 19, 1925
with PAPER TRADE JOURNAL.

International Files Recapitalization Plan

Includes Budget Estimate of Earnings for 1937 of Nine Million Dollars — Preferred Dividend Accumulations and Present Capital Deficit of Company Would Be Eliminated — New Preferred May Be Issued Under Plan.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 15, 1937—A budget estimate of earnings for 1937 of $9,000,000 against actual earnings in 1936 of $4,786,241 and loss of $3,323,432 in 1935, is included in plan filed by International Paper and Power Company with SEC for recapitalization, which will eliminate preferred dividend accumulations and present capital deficit of about $20,000,000. The plan calls for creation of a new preferred stock to replace present 6 per cent and 7 per cent preferred stocks, and a new common stock to replace the three classes of common stock now outstanding.

Under the plan holders of the present 7 per cent preferred would receive one share of new 5 per cent convertible cumulative preferred for each share now held, and one share of new common; holders of 6 per cent preferred would receive one share of the new 5 per cent preferred and three-quarters of a share of new common.

Holders of present common would receive new common as follows: for each share of Class A common stock 8/20ths of a share of new common and common stock purchase warrants for 12/20ths of a share of the new common at $25 a share; for each Class B share, 6/20ths of a share of new common and common stock purchase warrants for 9/20ths of a share of new common at $25; for each Class C share, 3/20ths of a share of new common and common stock purchase warrants for 9/40ths of a share of new common at $25 a share.

Outstanding Shares

As of December 31, 1936, outstanding shares were:

	Authorized	Outstanding
7% cum. pfd. ($100 par)	1,000,000	*914,746
6% cum. pfd. ($100 par)	20,000	3,708
Class A common (no par)	5,000,000	832,596
Class B common (no par)	3,000,000	821,805
Class C common (no par)	5,000,000	2,122,389

* Including 4891 shares held by International Paper Co.

It is proposed to change capitalization so that, except for possible increases due to further exchange of International Paper Co. stocks for shares of the company or possible decreases in outstanding stock, between December 31, 1936, and date the plan becomes effective, it will be as follows immediately after the change:

	Authorized	Outstanding
5% cum. conv. pfd. stock ($100)	1,000,000	918,454
Common stock ($15 par)*	6,000,000	1,815,465
Common stock purchase warrants	{Warr'ts for 1,348,218	{Warr'ts for 1,346,907

* Of the 4,184,535 shares of authorized common stock not shown.

Savings Effected by Plan

Savings and other benefits will be effected by the plan, according to the company, as:

1—It will remove present capital deficit and permit directors, if they so determine, to resume payment of dividends during 1937, and avoid some of the burden of present federal tax on undistributed profits.

2—It will reduce annual fixed dividend charges to a level it is reasonable to believe can be covered by earnings under normal business conditions.

3—It will provide the company with a preferred stock and a common stock which will be a suitable medium for future financing if it needs additional capital,

4—It will be a step in direction of further simplification of security structure by affording a basis for an ultimate capital structure consisting solely of common stock.

Above as outstanding 2,296,135 shares will be reserved for conversion of the 5 per cent preferred; 1,346,907 shares reserved for exercise of the warrants; and the balance of 541,493 shares will be unallocated.

Utility Act Exemption Asked

The application was filed with SEC under the Public Utility Act with a request that after hearing on the plan, which will be held March 29, the Commission make and furnish the company a report on the plan. The company in its application also requested exemption from provisions of Sections 4(A) and 6(A) of the act insofar as they apply to changes in rights of shareholders involved in the plan or the issue, distribution, sale or exchange by the company of the securities to be so issued, etc., in accordance with provisions of the proposed plan for change in capitalization.

The company had previously filed an application for exemption as a holding company. Such application is now pending.

The plan is subject to an alternative that if affirmative vote of at least two-thirds of 6 per cent cumulative preferred stock is not obtained, and if at least two-thirds of

(Continued on page 38)

New York and Pennsylvania Plan Extension

Two Additional Buildings to Be Constructed — One to Be Used for Manufacture of Special Fillers for Pulp—Paper Making Machines to Be Rebuilt and Remodeled — Two New Westinghouse Turbines Are to Be Installed.

[FROM OUR REGULAR CORRESPONDENT]

LOCK HAVEN, Pa., March 15, 1937—The New York and Pennsylvania Company, which for years has been one of Lock Haven's major industries, is planning extensions to its physical plant and remodeling of its paper making equipment which will place it in the forefront of industries of its kind.

Contracts have been let for the erection of two additional buildings and a new water tank for the fire sprinkler system. Work has already started on some of the buildings and will be completed by the first of next year.

When all additions are completed, the number of employees on the payroll will be increased by forty to fifty men.

Work Involved

The work will involve the rebuilding and remodeling of the paper making machines, bringing the plant up to the peak of efficiency made possible by the most modern methods and machinery.

In place of the present turbines, which were completely submerged by the flood waters of last March, two new 5,000 kilo-volt-amperes Westinghouse turbines will be installed. These will be placed at a point above the March flood level. Last year one of the difficulties in the resumption of operations following the flood was the enforced delay in the rehabilitation of the turbines put out of commission by the water and mud.

One of the new buildings will be used for the manufacture of special fillers to be added to the pulp in the making of the more special and finer grades of paper. This building will be approximately 29 by 78 feet in size, two floors, of steel and transite construction. The other building will be used as a storehouse. It will be one story, steel throughout, with dimensions of 60 by 120 feet.

Workers Employed

What the New York and Pennsylvania Company, and its associate industry, the Castanea Paper Company, mean to this community is best understood by a knowledge of the number of workers who are now employed. As of March 1, the payroll of the Nypen mill showed 665 employes—562 men and 103 women. At the Castanea mill the total number of employees was 250, only four of which were women. The total is 915 and this will be jumped up close to 1,000 at the end of this year.

In the meantime, the work of construction, soon to start in real earnest and continuing throughout the Summer, will give employment to a substantial number of workers. All applications for work should be made directly to the representative of the contractor, the John W. Ferguson Company, of Paterson, N. J., to whom the contract has been awarded. This company previously has done construction work at the Nypen mill.

History of Company

The paper mill which brought about the incorporation of the New York and Pennsylvania Company, began operations in the early 1880's when it was started by L. D. Armstrong, father of Calvin R. Armstrong and Mrs. Richard S. Quigley. The A. G. Paine family of New York became identified with the company at the time of its incorporation in 1890. Throughout the period since then, the "paper mill" as Lock Havenites speak of it in familiar terms, has consistently carried on its operations. The record the management has made has earned the respect of all who are acquainted with the industrial life of this community.

The Castanea Paper Company was started in 1920 and went into production the following year. Both the Nypen and Castanea companies are managed by the same executives, who are:

A. G. Paine, Jr., chairman of the board of directors; Eustis Paine, president; Vinson M. Stouck, vice-president and general manager; C. A. Clough, secretary and general sales manager; H. S. Oliver, treasurer.

Standard Paper to Reorganize

[FROM OUR REGULAR CORRESPONDENT]

RICHMOND, Va., March 15, 1937 — A petition for reorganization of the Standard Paper Manufacturing Company, one of Richmond's two largest paper mills, has been granted in the United States District Court by Judge Robert N. Pollard, who appointed Overton D. Dennis of Richmond and Elis Olssen of West Point as trustees and set April 1 for a hearing on the continuation of the trusteeship.

According to the company's petition the concern, while not insolvent, is unable to meet its obligations as they mature, all of them being current. In order to assure the orderly continuation of its business and protect certain contracts for the purchase of raw materials under which the sellers had a right to demand security or cash, the company applied to court under Sections 77A and 77B of the Federal Bankruptcy Act, the petition states.

Under the trustees there will be no change in management or operation of the plant and "the stockholders are very much better off than before," according to James F. Ryland, vice-president and general manager.

"It merely had become a top-heavy financial structure," he continued, and had to be revamped. This was considered the best way to do it. The company's business is better today than it has been in several years."

New Paper Mill for Mexico

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 15, 1937.—The Mexican firm of "Pipsa", Productora e Importadora de Papel, S. A., Mexico City, proposes to erect a large wood pulp and paper plant through governmental and private financial assistance at Toluca, State of Mexico, at an estimated cost of 9,800,000 pesos. The plant will cover 20,000 square meters, and is expected to be ready for operation by November 1937.

Machinery will be purchased in accordance with the proposed daily output of 60 metric tons of wood pulp, 50 tons of raw and 30 tons of bleached cellulose (sulphite) for newsprint, 33 tons of cellulose (kraft), and 20 tons of cellulose (chloride) for light wrapping paper and perhaps certain equipment for the rayon industry.

New Sulphite Mill May Be Built at Port Arthur

Engineers of Lake Sulphite Pulp Co., Inspect Sites for New Plant In Vicinity of Nipigon, Ont. — R. O. Sweezey, of Montreal, Head of Organization, Announces That Construction Work Will Be Started As Soon As Possible.

TORONTO, Ont., March 15, 1937.—The inspection of possible sites for the new $5,000,000 sulphite mill of the Lake Sulphite Pulp Company is being conducted in the vicinity of Nipigon by a party of engineers. It is rumored that the location may be in Port Arthur, but no definite decisions has been reached as yet. R. O. Sweezey, of Montreal, who is head of the newly organized company, announced that construction would be started as soon as possible with prospects that the mill will be in operation by February of next year. Mr. Sweezey stated that the first physical problem to be met would be ensuring an ample supply of pure water, for which purpose sampling of the water at various places on the Nipigon is under way. It is planned to construct the mill in units of 100 tons each, reaching a final output of 400 tons daily. Mr. Sweezey added that 135,000 cords of wood would be required annually on the basis of 200 tons of sulphite pulp per day, while over 300 men would be employed in the plant. It is expected the mill will supply markets in the United States. To the new company there has been allocated by the Ontario Government some 2,000 square miles on Lake Nipigon, Nipigon River, Lake Superior, and east of Nipigon on the Canadian National Railways.

Earnings of F. N. Burt Co. Rise

The total earnings for 1936 from operations of F. N. Burt Company, Ltd., Toronto, amounted to $367,390, after deducting all expenses incident to operations, as compared with $371,983 for 1935 before addition in that year of a non-recurring item of $29,573 arising from the sale of the Drake Department, or $401,556 after inclusion of that item. Provision for depreciation of $146.410 and for federal income taxes of $26,700 left net earnings of $194,280 for 1936, against $221,337 the preceding year. Net per share on common for 1936 amounted to $1.77 per share compared with $1.93 for 1935. Despite capital expenditure in 1936 for opening a new department, the company closed the year in an excellent liquid position, with net working capital of $1,360,456, compared wih $1,470,-597 at the end of the previous fiscal year.

S. J. Moore, chairman of the board, and E. G. Baker, president, state that new lines of products are being developed to replace the cigarette box business, formerly of large volume and which is now being supplanted by paper wrappers. During the year a new department was established at Buffalo for the manufacture of lithographed folding cartons, requiring a substantial investment for machinery and equipment. Officials say there is a large market for this product, but it will take time to build up a profitable business. The expense incurred in development work has been charged to a special reserve.

News of the Industry

The Hinde and Dauch Paper Company of Canada, Toronto, has given notice to holders of 5½ per cent, first mortgage, sinking fund, gold bonds, Series A that on May 1 next they will redeem all these bonds which may be outstanding at par with a premium of 2½ per cent and interest accrued thereon to May 1. After that date coupons for interest will become null and void.

D. A. Evans, resident manager of the Powell River Company, Powell River, B. C., recently announced a general increase in salaries and wages approximating five per cent to about sixteen hundred employees, the raise going into effect on March 1. The directors felt after reviewing developments in the newsprint industry that sufficient improvement is now in evidence to warrant reinstatement of a further part of reductions made during the depression period.

The Spruce Falls Pulp and Paper Company, Ltd., Kapuskasing, Ont., have taken over the Northland Grocers, Ltd., a large wholesale grocery business which is now conducted as a department of the paper company.

Walter Laubengayer, manager of the Port Arthur office of the Detroit Sulphite and Paper Company, Detroit, and subsidiaries, returned recently to Port Arthur after an extended business trip to Eastern Canada and the United States. He spent some time attending the forestry conference at the Forestry School of the University of Michigan, of which he is a graduate. Speaking of the matter of utilization of southern pine in the production of newsprint, which was discussed at the conference, it was stated that considerable experimentation work had been done along this line. It is declared that the experimental stage has now been passed, and mills are being constructed and will soon go into production.

The annual meeting of the Ontario Pulp and Paper Makers' Safety Association will be held at the King Edward Hotel, Toronto, on Wednesday, March 31. Walter Barber, of Toronto, is the president of the Association and D. B. Chant, secretary-engineer.

A bill has been introduced in the Ontario Legislature to provide a minimum wage for male workers in lumber and pulpwood camps. It is stipulated that any person on a piece-work basis shall receive not less than $40 a month exclusive of board and lodging.

G. H. Woods & Co., Ltd., Toronto, who produce sanitary products and equipment, are adding installations for turning out paper doilies at their plant 323 Keele Street. Two complete units and other equipment in the line of dies have been purchased from the Whedon Paper Converting Company, Los Angeles, Calif.

The Alliance Paper Mills, Merritton, of which George W. Pauline, of Toronto, is president, who turn out a house organ known as the "Alliance Coater", feature in the last issue several pictures showing coating machine, mixing vat dryer, supercalender, etc., of the company.

To produce returnable and non-returnable paper mill cores Sonoco Products of Canada, 33 Park Avenue, Brantford, Ont., who make paper cones, boxboard cloth cores, etc., have rented new premises for the new department. The new cores turned out are employed in the manufacture of newsprint and other papers.

B. A. Blausen Joins Baldwin

The Baldwin Paper Company, Inc., of New York, announces the appointment of Bernard A. Blausen as vice president in charge of publication and book paper sales. Mr. Blausen's experience dates from 1930 and, although all of this time has not been devoted exclusively to the paper business, he has made an enviable record as a creative salesman.

Wisconsin Mills Announce More Wage Increases

Wolf River Paper & Fiber Co., of Shawano, and Badger Paper Mills, of Peshtigo, Grant Additional Benefits—Kimberly-Clark Corp. of Neenah, Announces Vacations With Pay For Workers With Ten or More Years.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 15, 1937.—Improving conditions and the desire to pass additional benefits on to the workers have been manifested with several new examples within the last week or two. Two more wage increases have been announced. One of these is at the Wolf River Paper and Fiber Company, Shawano, Wis., where a higher scale went into effect February 15. This is the second increase since last December. The other is at the Badger Paper Mills, Inc., Peshtigo, Wis., where a wage increase went into effect March 16, the second to be granted since January 1. The new schedule adds about $50,000 to the annual payroll.

At the Kimberly-Clark Corporation, Neenah, Wis., a new policy was put into effect at a meeting of the general mill council at the company's offices. The council is made up of representatives of the employees and management. The new rule provides that all hourly wage employees who have been with the company for ten or more years will receive vacations with pay, beginning this summer. Formerly, only those with fifteen years of service were eligible. Vacations will be given 1,050 employees of the Wisconsin and New York mills, or 29.91 per cent of all workers. The former policy made only 489 eligible. A new schedule for those with broken service records also was adopted. A committee composed of Harold Ferd, representative of the Kimberly, Wis., mill; C. G. Eubank, of the industrial relations department, H. G. Boone, general superintendent, and George J. Kronschnabel, general secretary of elective mill council groups, was appointed to make a three-month survey of vacations in relation to operating schedules.

Mosinee to Use Water Wells

Arrangements are being made by the Mosinee Paper Mills Company, Mosinee, Wis., to abandon its water supply taken from the Wisconsin River and use wells instead. The company has made an offer to the city of Mosinee to connect the mill with the present city wells by a pipe line, and to furnish pumpage to the city without cost. The company also has offered to drill test wells with a view to establishing additional wells, which will be financed by the company. The city is to pay 50 per cent of the cost of drilling the test wells, and to construct a three-phase power line from the mill to the city pumping station. A 12-inch pipe line would be laid to bring the water to the mill. Under this plan, the company would furnish the city with a pumpage of 500 gallons of water per minute. The proposal has been placed before the city council and is being investigated. Finer grades of paper are being made at the Mosinee mill, requiring a cleaner water supply.

New Storage Reservoir Operates

Operation of the Wisconsin Valley Improvement Company's newly built storage reservoir on the Big Eau Pleine River was started officially last week when four gates were closed. The capacity is 4,400,000,000 cubic feet, a capacity which will be reached only five times in eight years from the tributaries of the river. When a proposed tunnel from the Wisconsin River is constructed, the reservoir will be filled oftener so the water can be held until needed for power by the mills along the Wisconsin. The company hopes to fill the reservoir this spring for use during low stages this summer, although seepage makes this doubtful.

News of the Industry

A new raw material for commercial chemicals has been discovered by the Salvo Chemical Company, Rothschild, Wis., according to F. J. Zimmerman, general manager. He has not revealed its identity, but says it will furnish additional basic materials. The company is manufacturing vanillin and other chemicals at its plant now, using as its raw material the residue of the sulphite liquor salvage plant of the Marathon Paper Mills Company at Rothschild. The present operations using mill waste are only a small beginning of developments in the paper manufacturing area, Mr. Zimmerman says.

The Marber Paper Company, Milwaukee, Wis., wholesalers of wrapping paper, has leased 3,000 square feet of additional space at its present location at 225 North Broadway, according to Milton Marks, manager. Expanding volume of business has made additional storage space necessary.

Dr. C. E. Marshall, associate professor of soils at the University of Missouri, was to be the speaker Wednesday evening, March 17, at the monthly meeting of the Northcast Wisconsin section of the American Chemical Society, to be held at the Institute of Paper Chemistry, Appleton, Wis. His subject was to be "The Constitution and Reactions of Clays." Dr. Marshall came to this country in 1936 as a visiting associate professor of soils. He had been an assistant lecturer in agricultural chemistry in the University of Leeds, England, and has done considerable research in this field.

Warren T. Murphy has been appointed supervisor of the Nicolet National Forest in Northern Wisconsin, with headquarters at Rhinelander. He was transferred from Michigan, where he was superintendent of the Huron National Forest. Mr. Murphy succeeds Axel G. Lindh, who has been promoted to a position in the forestry office in Washington, D. C. The transfers went into effect March 16.

Charles E. Voss, mechanic at the Kimberly-Clark Corporation's mill at Kimberly, Wis., died March 12 following an operation. He was 49 years old. Mr. Voss was serving as an alderman of the City of Appleton, Wis. He had been employed by Kimberly-Clark for thirty years.

Buying Versus Being Sold

The Morton C. Tuttle Company, paper mill engineers, of Park Square, Boston, Mass., have just issued a new pamphlet "Buying Versus Being Sold," which concisely indicates the manner by which the executive can do much to control the cost of new building work and consequently keep capital investment at a minimum.

The frontispiece of this pamphlet is the new plant of the West Virginia Pulp and Paper Company at North Charleston, S. C., now being built by the Morton C. Tuttle Company.

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CLEANEST

In the Bird Centrifiner all of the stock is *triple treated* —three distinct and different applications of centrifugal separation. The result is *cleanest* paper. . . . If making *your* paper as clean and salable as it can be made means anything to you, let us tell you more about modern, triple-treatment Centrifining.

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASSACHUSETTS

THE BIRD CENTRIFINER

YOU CAN MAKE MORE MONEY WITH NEW BIRD MACHINERY

Rothermere Predicts World Newsprint Shortage

Head of Harmsworth Chain of British Newspapers Expresses View That Canada Is "On Top of World" In This Age of Cellulose — States Future of Industry Will be Golden Opportunity For Dominion Manufacturers.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Ore., March 15, 1937—Papers here are giving prominence to statements published in the English press by Lord Rothermere, head of the great Harmsworth chain of newspapers, dealing with what he declares is an imminent world-shortage of newsprint, and declaring that Canada is "on the top of the world" in this age of cellulose, which he says "will be for Canada a golden opportunity."

Tremendously Expanding Industries

Rapidly increasing use of newsprint is only part of the problem, he states, for the trees which are the raw material for newsprint are the raw material for tremendously-expanding industries of all kinds. He proceeds:

"Sheets of newsprint like those on which these words are printed could be metamorphosed into scores of articles in common use. Treated in one way they would emerge as a suit of clothes hardly distinguishable in quality from good worsted. Fling them into a vat, pass them through a bath of acid, and they will come out as artificial silk, or rayon, as its makers call it, ready to be woven into a vast range of attractive fabrics.

"The wood-pulp of which these pages are made might serve as a basis for the manufacture of ropes or wickerwork, carpets or upholstery, plastic materials or the lacquer to cover them. An artificial textile is now very largely used for the manufacture of shirts and clothes in Germany. German scientists are also making sugar, alcohol, vinegar, glycerine, resin, tannin, and cattlefeed from precisely the same kind of wood as that which provided the newsprint on which these words appear.

Shrinkage In Supply

"Not only can wood-fibre replace the product of plants like cotton, flax and hemp; the fleeces of sheep, or the furs of wild animals; the products of silkworms and the feathers of birds. It can further be used as the basis of a nation's needs in a wide range of other articles, from foodstuffs to explosives, from furniture to lubricants.

"All this is in addition to the swiftly increasing consumption of wood-pulp for the manufacture of newsprint, which in Canada—where more than one-third of the world's supply is made—had two years ago already reached the highest level of output in history."

He further declares that even if the newsprint industry were the only consumer of pulpwood the world would still be faced with a prospective newsprint famine. The spruce and fir forests of eastern Canada, Scandinavia and Finland are a steadily diminishing source of supply. He mimimizes the possibility of Philippine bamboo or the jackpine of the Southern States replacing the spruce, fir and hemlock resources of Canada as a source of the world's growing woodpulp requirements, and concludes:

"Yet, though the Canadian newsprint industry has for years been running at a loss, largely owing to unwise competition and unbusinesslike arrangements with its customers, its resources remain unimpaired.

"It is unrivalled in the world for the excellence of its plant, the skill and experience of its personnel, the abundance of its supplies of water and power, and, above all, the possession of conveniently situated supplies of the best timber for making woodpulp.

"The lessons learnt in the long period of depression will guide the pulp and paper-makers of Canada in taking advantage of the unprecedentedly favorable conditions now opening before them.

"They control by far the largest source of a raw material which is in fast growing demand, not only for its major use in paper-making but for all sorts of subsidiary purposes that have only recently come into existence.

"Nothing can be surer than that this age of cellulose will be for Canada an age of golden opportunity."

Howard Smith Earnings Higher

A substantial improvement both in earnings and balance position is shown in the 1936 financial statement of Howard Smith Paper Mills, Ltd. Net operating profit was $2,188,030, against $1,885,142 a year ago, and total income $2,192,311, against 1,889,847. After sundry charges, including depreciation and taxes, etc., the net profit was $667,087, against $451,925. After payment of dividends for three quarters, totalling $277,824, the surplus, subject to a deduction of $80,236 for minority interest therein, was $389,262, equivalent, after that deduction, to 77 cents a share on the 274,648 shares of common outstanding at the close of the year. At the end of 1935, common outstanding totalled 220,000 shares. The balance sheet shows a further expansion in working capital, $2,537,610 comparing with $2,318,365 a year ago.

Harold Crabtree, president, in his report mentions the formation of a new subsidiary organized under the name of Howard Smith Chemicals, Ltd., for the manufacture of vanillin, a fine chemical which is used as a base for flavoring extracts. The plant, which is located adjacent to the sulphite mill at Cornwall, is now nearing completion and it is expected will come into operation early in 1937. He adds: "The majority of the common shares of this company, which was financed independently, are held by your company. This is an entirely new venture inasmuch as it is the first time that an attempt has been made, on a commercial scale, to extract vanillin as a by-product in the manufacture of sulphite pulp. While it will necessarily take some time to develop, it would seem to hold promise for the future."

Canada Paper Company, a subsidiary of Howard Smith Paper Mills, Ltd., reveals an operating profit of $472,524, as against $338,085 for the preceding year.

Lincoln Moves Cincinnati Office

The Lincoln Electric Company, Cleveland, Ohio, announces a change in address of its Cincinnati office from Fifth and Baymiller streets, to Room 602, American Building, Central Parkway at Walnut street. This change follows the recent flood conditions of the Ohio River. At the new location, F. H. Smith and E. T. Gregory will maintain a complete stock of Lincoln welding accessories and supplies and will be available for consultation on any problem involving the application and use of welding.

A GILMER V-BELT has *straight sides* that instantly bulge outward as the belt flexes around the sheave.

It would bulge along the dotted lines if steel sidewalls did not prevent. So the bulging distributes itself over the entire width (cross-hatched) of the belt.

All the cross-hatched area represents pressure against each sidewall. This lateral stress exerted across the entire thickness of the belt naturally creates a snugger, firmer grip—*Gilmer Grip*. Locking with much the same action as a friction clutch, Gilmer Grip cuts out slip and *delivers more power*. More power means more profits. The Gilmer Grip pays! . . . It's a feature, too, of Gilmer Single Strand V-Belts for fractional horsepower drives.

Gilmer Top Rubber is tough tension rubber with extra "give" that prevents "misfits" on multiple drives.

Gilmer Pulling Cords are super-strong, rubber-locked plies that concentrate great strength in a thin pulling section. Gilmer patented construction keeps these plies horizontal in operation on multiple drives.

Gilmer Bottom Rubber is brute-strength rubber specially developed by Gilmer engineers. It supports pulling cords securely, gives great crosswise rigidity, and *resists heat*. Gilmer V-Belts run cool on multiple drives.

Gilmer Double Jacket construction prevents worn spots at any one point, more than triples the belt's working life on multiple drives. Twin jackets of tough bias-woven fabric are separated by a thin film of flexible rubber.

Gilmer Controlled Stretch insures perfect, permanent *matched working lengths* on multiple drives. Gilmer engineers pre-test every Gilmer V-Belt for stretch under maximum load.

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Chicago Reports Advances On Many Grades

Prices on Sulphite Bond, Writing and Ledger Papers Rise Materially — Kraft Wrapping Paper Continues to Display Strength — Paper Board Quotations Higher — Offerings of Numerous Varieties of Paper Limited Made.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 15, 1937.—Chicago paper headquarters continue to report price advances in many grades. Along with the advances has continued a substantial demand which would indicate that even higher prices are in the offing as the general commodity market continues its spurt. In all cases, according to local reports, manufacturers and converters have long ago used up supplies purchased at low prices and are now confronted with increasing the prices in virtually all lines to cover both commodity costs and production costs.

This week saw confirmation locally of the $7 a ton advance in sulphite bond, ledgers and writings. Also a $5 advance in No. 3 mimeo and of $10 a ton in No. 3 bond and ledger. Number 4 ledger, mimeo and duplicator is reported as having increased $10.00 while No. 3 papetrie went up $5. Ground woods are expected to show a further advance in price possibly the first of next week, according to reports. Krafts are on a basis which makes price ranges hard to report but the product is well and away the bellwether in most current changes. Board is in higher ranges. Newsprint is reported as somewhat lagging in the parade to higher ground but demand is considered fair in this product. Books and covers remained in good demand during the week. Waste papers were about the same.

Dixie-Vortex Earnings

The Dixie-Vortex Company, successor to the Vortex Cup Company, following the merger with the Individual Drinking Cup Company, Inc., in the Spring of last year, this week reported 1936 consolidated net income of $875,527 or $2.11 a share on 202,916 shades of no par value common stock outstanding. This figure includes earnings of Individual Drinking Cup for the four months preceding its merger with Vortex. Net income of Vortex alone for 1935 was $312,476 or $1.35 a share on common stock then outstanding. Combined net income of the two companies was $645,133. Indicated net income for the fourth quarter of 1936 for the consolidated companies was $4,668.

Waste Material Convention

Plans are complete for a record breaking convention of the National Association of Waste Material Dealers, Inc., which is to be held March 15, 16 and 17, at the Hotel Sherman. The three-day session will terminate on the evening of March 17 with an annual banquet. Group meetings of all the divisions, including the waste paper dealers, are scheduled. The Waste Material Institute will have an important part to play in the sessions, according to M. Pushker, secretary and H. Finder, Aetna Waste Paper Company, president of the Institute. More than 1500 waste material executives, including about 300 waste paper men, will be present when the session convene this mornings.

News of the Industry

The Mid West Division of the Salesmen's Association of the Paper Industry held its regular meeting on March 8, with Jack Burrus presiding. Most of the meeting was given over to a discussion of market conditions. Douglas Evans, representing the W. C. Hamilton Paper Company, of Miquom, Pa., was present and announced that that company was planning to open a Chicago sales office, although no specific site had been selected as yet.

Another newcomer in the Chicago area is H. M. Early, of the International Paper Company, who has been transferred to the Chicago offices of that company in the Conway Building. Mr. Early, who is reported to be a golfer who will give the local salesmen par shooters something to shoot at will cover the midwest territory for the International organization.

An item of interest to the paper industry is that the Bantam Ball Bearing Company, of South Bend, Ind., has changed its name to the Bantam Bearings Corporation to provide a name more suitable to the product manufactured. The company is a subsidiary of the Torrington Company, of Torrington, Conn.

The Judiciary committee of the Illinois House of Representatives has favorably reported on a bill to tax all foreign bidders for State and local political business 3 per cent of the total sale. The bill is designed to equalize competition between Illinois companies and outside the State Companies bidding for State business. It is of interest to those concerned supplying paper and paper products to State units.

The Munising Paper Company, Chicago, recently announced the appointment of the Quaker City Paper Company, of Philadelphia, as a distributor of Caslon Business Papers, which include Caslon Bond, Mimeograph and Ledger.

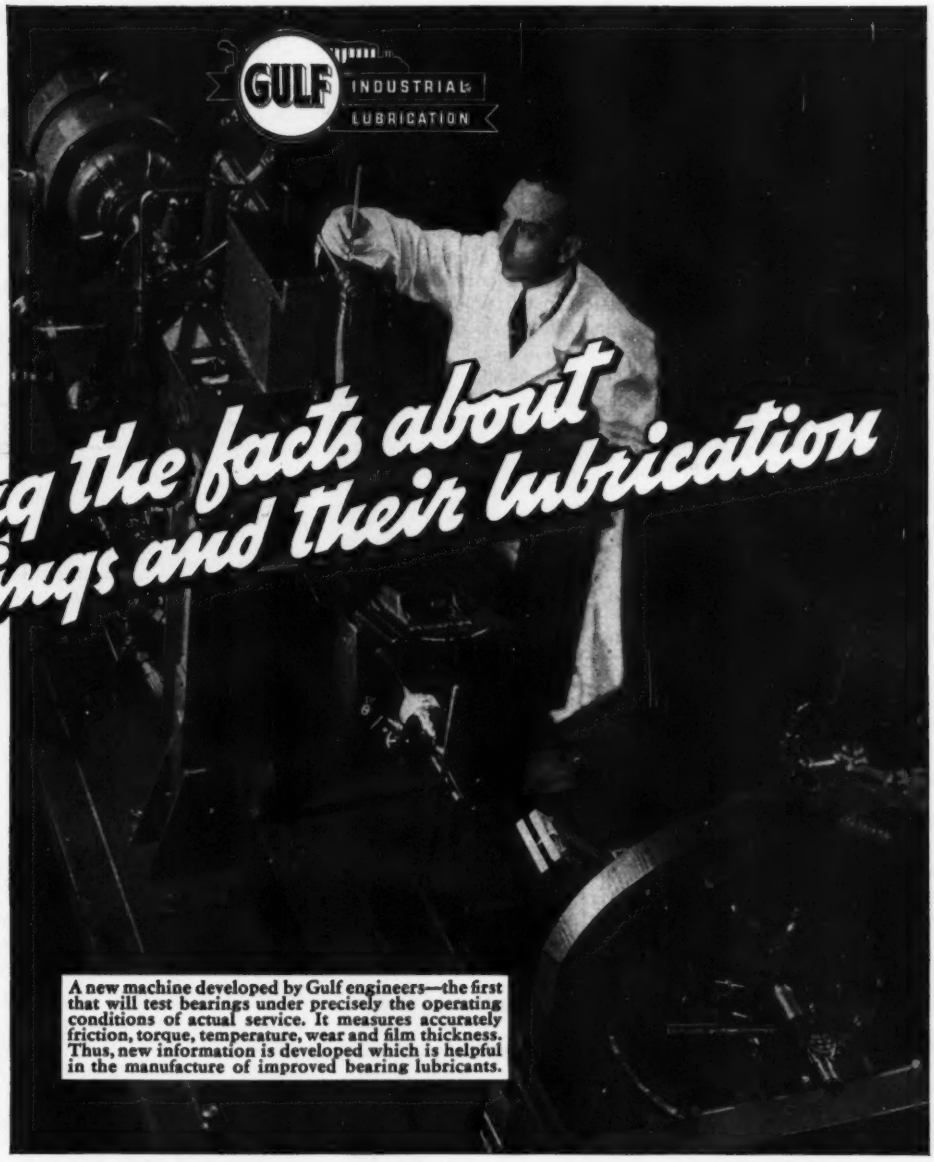
Irving McHenry, president of the Mid-States Gummed Paper Company, was presented with a gold watch and silver plaque in honor of his 20th anniversary as founder and present head of the Chicago concern at a recent anniversary dinner celebration. John Levey, treasurer of the company, was the master of ceremonies and presented the watch on behalf of employees and associates. T. H. Mittendorf, director of sales, expressed the feelings of the employes in presenting the plaque to Mr. McHenry.

David Blanchard's New Post

The Magnus Chemical Co., Inc., Garwood, N. J., manufacturers of cleaning materials, industrial soaps, sulfonated oils, emulsifying agents and metal working lubricants, announces the appointment of David Blanchard as vice-president in charge of sales.

Mr. Blanchard has been vice-president of the company for the past fourteen years, in charge of the Portland, Me., office, where he made an enviable sales record. In fact, since 1930, Mr. Blanchard has led the sales force now numbering over sixty representatives. He was an officer in the Aviation Section of the U. S. Army during the World War.

One of the pioneers of the Magnus Chemical Company at its inception in 1921, Mr. Blanchard has literally grown up in the industrial cleaning field. He will have supervision of the Magnus sales organization and direct the merchandising of many new products being put forth by the company at this time.


GULF
INDUSTRIAL
LUBRICATION
Proving the facts about bearings and their lubrication
A new machine developed by Gulf engineers—the first that will test bearings under precisely the operating conditions of actual service. It measures accurately friction, torque, temperature, wear and film thickness. Thus, new information is developed which is helpful in the manufacture of improved bearing lubricants.

GULF ENGINEERS Seek . . . and FIND . . . the Answers

to many questions regarding bearing lubrication

WHAT is the practical relation of viscosity to shaft speed, bearing load and various bearing metals?

WHY are some bearings *easy* to lubricate while others of similar construction and in similar service are *difficult* to lubricate?

HOW can present lubricants be improved to anticipate future progress in bearing design and application?

These and many other problems regarding bearing performance are being studied every day by Gulf scientists in the most modern petroleum research laboratory in the world.

These laboratory findings—supplemented by 37 years of practical experience—are being converted into operating benefits for industry. The result—to users of Gulf quality lubricants—is lower costs for maintenance and lubrication.

GULF OIL CORPORATION
GULF REFINING COMPANY

GENERAL OFFICES: GULF BUILDING, PITTSBURGH, PA.

Obituary

Felix Pagenstecher

Felix Pagenstecher, a prominent paper manufacturer, whose family had been connected with the paper manufacturing industry in Germany and in this country for many generations, died Monday of a brain tumor at his apartment in the Hotel White, Lexington avenue and Thirty-seventh street, New York. He was 56 years old.

Mr. Pagenstecher's ancestors came to this country in the middle of the last century and settled in the Middle West, where they continued and extended their paper business.

Born in Chicago, Mr. Pagenstecher attended schools there and joined the business enterprises of his father, Carl Pagenstecher, at the age of sixteen. He came to New York about a year ago and joined the manufacturing department of the International Paper Company.

In the early days of his business activities he was with the Riverview Coated Paper Company of Kalamazoo, Mich., and became president of that organization in 1903, a position which he held until 1919.

From that year until 1931 he was president of the Bryant Paper Company of Kalamazoo. Since 1931 he served as president of the Hawley Pulp and Paper Company of Oregon City, Ore., and was vice-president of the Nekoosa-Edwards Paper Company of Port Edwards, Wis.

He was present at the American Paper and Pulp Association's celebration of its golden jubilee at the Hotel Waldorf in 1927, when he was elected an officer for the coming year. He was again elected as an officer of that association two years later and once served as its vice president.

Before coming to New York he held directorships in the First National Bank and Trust Company and other financial institutions in Kalamazoo.

He is survived by his widow, Mrs. Edith Pagenstecher, and a son, Robert.

A. R. Currie

BUFFALO, N. Y., March 15, 1937—A pioneer in the paper industry in Buffalo, Alexander R. Currie, aged 76, former vice-president of the George Irish Paper Corporation, died recently at his residence, 448 West Delavan Avenue.

Born in Buffalo, December 13, 1860, the son of Alexander and Sarah Currie, he entered the employ of the Irish corporation at the age of fourteen as office boy.

Mr. Currie remained with the Irish corporation for 42 years. Following the death of George Irish he became vice-president of the concern, which manufactures writing paper, twine, school supplies and novelties. He retired in 1914 to devote his time to several paper concerns as mill representative.

The paper pioneer was a life member of Hiram Lodge of Masons, St. Andrews Scottish Society and the Third Church of Christ Scientist. He also was a member of old Company "D" of the Buffalo City Guards, now disbanded. For many years Mr. Currie was an active member of the Rotary Club.

He is survived by his wife, Anna Pooley Currie; two daughters, Mrs. Clarence W. Peck, of Gloversville,, and Mrs. Luther H. Kendall, of this city; a sister, Miss Annie Currie, and a brother, William, both of Buffalo.

Frederick W. Angel

[FROM OUR REGULAR CORRESPONDENT]

Frederick W. Angel, director of the Newfoundland Power and Paper Utilities Corporation and prominent for years in Newfoundland's industrial life, died suddenly at St. Johns, Newfoundland, March 4. He was 63 years of age. Graduating in engineering from McGill University in 1898, Mr. Angel returned to St. Johns and within ten years had become one of the country's leading consulting engineers.

At his death, he was president of William Heap & Co., and William Noseworthy, Ltd.; vice-president and managing director of the Bell-Island Transportation Company and secretary of the Consolidated Foundry, Ltd.

Norman Rehm

CHICAGO, Ill., March 15, 1937—Norman Rehm, aged 52, of 2615 Colfax Street, Evanston, Ill., died of a heart attack at the wheel of his automobile recently.

Mr. Rehm was president of the Paper Board Products Company, 228 North La Salle Street, and publisher of the trade magazine, *Fiber Containers*. He was born in St. Louis and graduated from Washington University there. He was a resident of Evanston for fifteen years, and a member of the Covenant Methodist Church.

Frank Dallam

SAN FRANCISCO, Cal., March 12, 1937—Frank Dallam, aged 67, head of the pioneer paper merchandising firm of Armes & Dallam, died recently at his home at 1101 Green Street after an illness of two months.

The firm of which he was head was formed here in 1850 by Dallam's father. He is survived by his wife, Oriel Dallam; one son, W. F. Dallam, and a daughter, Mrs. William C. McDowell, of Lexington, Ky.

Samuel S. Alling

BUFFALO, N. Y., March 15, 1937—Samuel S. Alling, 67 years old, 811 Potomac Avenue, a salesman for the Alling & Cory Paper Company for the last 47 years, died suddenly in his home recently after suffering a heart attack. He had been in ill health for about two years.

Born in Rochester, Mr. Alling was educated in public schools there, and also attended the Rochester Business Institute. He entered the employ of the Alling & Cory Company in 1890, moving to Buffalo in 1899 when the company established its plant at 136 North Division Street.

Mr. Alling was at his office for the last time Friday. Because of his ill health, he began about a year ago to work only half days, returning home each day at noon.

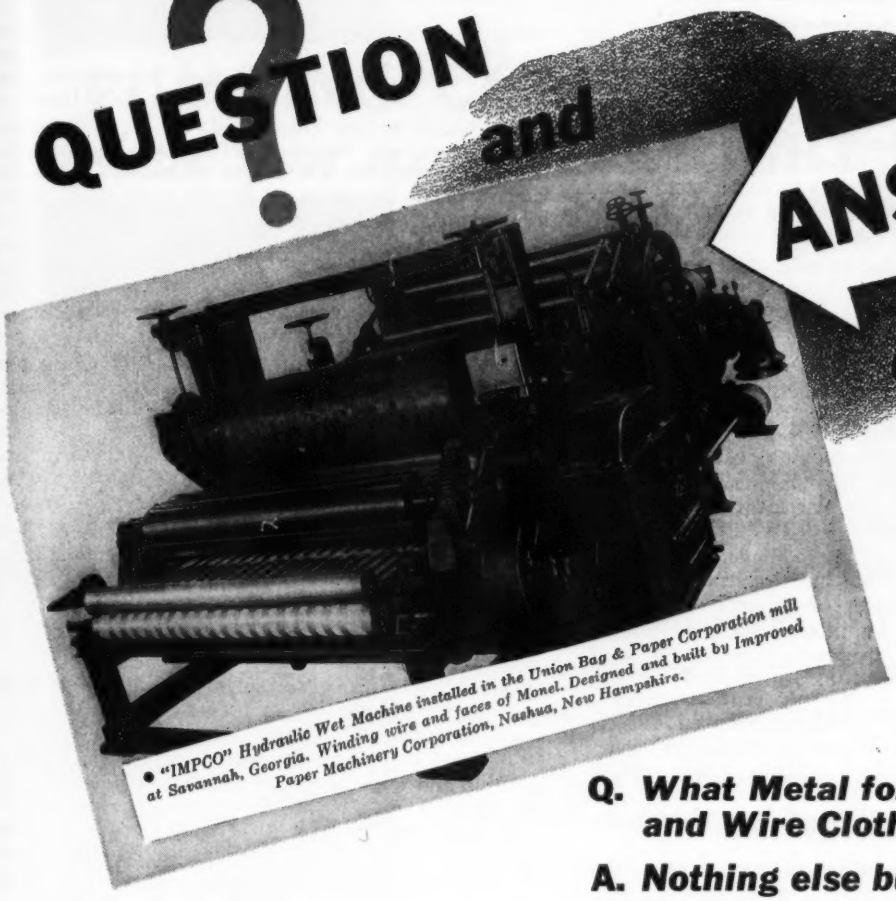
A 32nd degree Mason, Mr. Alling was a member of Washington Lodge, F. & A. M., the Shrine, and Buffalo Consistory. Survivors include his wife, Mabel Walling Alling; a daughter, Jeanne H. Alling, and a son, Paul S. Alling, Rochester.

H. B. Hall Joins Foster Wheeler

Announcement is made by Foster Wheeler Corporation of the appointment of Howard B. Hall as regional director in charge of its Cleveland, Cincinnati and Pittsburgh territories. Mr. Hall assumed his duties as of March 1, and he will make his headquarters in the Cleveland office of the Corporation at 526 Superior Avenue.

The experience of Mr. Hall covers a wide range of industrial activity, and for the last eight years he has been director of the industrial division of Murray and Flood, consulting engineers. Prior to that time, Mr. Hall served many years as corporation sales executive.

QUESTION and ANSWER on this Modern Wet Machine in a New Kraft Mill



● "IMPCO" Hydraulic Wet Machine installed in the Union Bag & Paper Corporation mill at Savannah, Georgia. Winding wire and faces of Monel. Designed and built by Improved Paper Machinery Corporation, Nashua, New Hampshire.

Q. What Metal for Winding Wire and Wire Cloth Faces?

A. Nothing else but . . . MONEL!

TWO REASONS WHY:

1 Winding wire and wire cloth facing must stand severe stress and abrasion, to give the long life that economy demands. Monel's* exceptional toughness and its greater-than-steel strength are the determining factors here.

2 Strength and toughness would be worthless if not combined with resistance to corrosion from Kraft stock. *Less than 1/1000 of an inch penetration per year* is the record of Monel tested in the bottom of a Kraft pulp diffuser; an excellent indication also of the usefulness of Monel with brown stock and black liquor.

Check up on Monel's unusual combination, and you'll make the same choice Union Bag made for this machine in their new mill. Write to-day for your free copies of "Monel in Pulp and Paper Mills"; "Caustic Alkalies vs. Nickel and Its Alloys"; and "Engineering Properties of Monel".

OTHER PLACES WHERE *Monel is Regularly Used in the Kraft Mill*

DIGESTER AND DIFFUSER

Sectional Lining in Rotary Digester
Cooking Liquor Valve Trim
Relief Line Screen
Blow-off Valve Trim
Diffuser Bottom Screen

BLACK LIQUOR

Filters—Filter Elements
Evaporator Tubes
Pumps—Rods and Liners; Shafts and Impellers
Washers—Wire and Faces of Molds

CAUSTICIZING

Circulating Pumps—Shafts and Impellers; Rods and Liners
Lime Mud Filters—Wires and Faces of Molds
Strainers in Caustic Settling Tanks

STOCK PREPARATION

Perforated Screen Plates
Screen Plate Fastenings
Decker—Wires and Faces of Molds or Vacuum Filters
Stock Pump—Shafts
Caustic & Resin Size Preparation—Nickel-Clad Steel Tanks
Alum Size—Monel Tie Rods and Fastenings on wooden tanks—Monel Troughs—Pump Rods
Coloring—Monel Mixing and Storage Tanks, Piping and Valves—Monel Troughs for Tub Coloring
Jordan—Fillings, Plug Bands, Shaft Sleeves
Wet Machine—Wire and Faces of Molds

PAPER MACHINE WET END

Feed Box—Monel Lining and Baffles
Slices and Adjusting Rods
Rolls—Monel Tubes and Monel covered Steel or Aluminum Tubes
Suction Box—Tops and Adjusting Rods on suction box diaphragms
Dandy Roll—Faces and Wires
Save-All—Trays, Spouts
Felt Rolls—Monel covered Steel Tubes
Doctor Blades—Blades and Fastenings

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.

MONEL

Philadelphia Paper Business Active

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., March 15, 1937 — Favorable reports from merchants and manufacturers in Pennsylvania indicate substantial increases in the volume of business. The kraft market reports a satisfactory firmness, with local distributors finding consumers willing to enter into long-term commitments. Paper board mills are advertising for any available supplies. Prices of paper stock are stiffening with all available offerings being bought up.

The Board of Governors of the Paper Trade Association of Philadelphia is scheduled to take place on Wednesday with luncheon at the Down Town Club. President Ormand Freile will preside. The delegates to the National Convention, recently held in New York, will make their reports.

Moore & White Company states that the amount of work coming in is very encouraging, especially for the 4-drum winders and rotary cutters for kraft and cardboard. This company also reports an unusually large number of replacement orders for maintenance work. The fact that mills are ordering replacement parts is indicative of a busy season ahead.

The Stock List Committee of the Philadelphia Stock Exchange has approved for listings and registration upon notice of issuance 100,000 shares of common stock of Scott Paper Company. The committee recently admitted to the list of the Exchange upon official notice of issuance 568,000 Scott Paper Company warrants or rights to stockholders to purchase its 3¼ per cent debenture bonds, convertible up to March 1, 1942, due March 1, 1952, to the extent of $1000 principal amount of bonds for each 142 shares of stock held.

Boston Paper Industry Notes

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 15, 1937.—The Proctor Paper Company has removed to 133 Pearl Street, where more desirable quarters are available. Almost all of the furnishings of the building are new, including the floors. The company occupies three stories.

Henry W. Ford, manager of the fine paper specialty department of the Andrews Paper Company, has returned from a few days' business trip to New York.

Albert T. Hicks, treasurer of Daniel M. Hicks, Inc., paper stock dealers, and George Oliphant, vice-president of Castle and Overton, Inc., with Joseph Dow, of the same company, all of New York, called on the trade last week.

Book Mills Grant Wage Increase

KALAMAZOO, Mich., March 15, 1937.—Effective April 1, 1937, the Allied Paper Mills, Bryant Paper Company, Kalamazoo Paper Company, and the Michigan Paper Company at Plainwell, will grant in increase of 10 per cent to their employees. The number of workers who will participate in the raise is approximately 3000.

Chamberlain to Address Paper Salesmen

A. H. Chamberlain, executive secretary of the National Paper Trade Association of the United States, will be the guest speaker at the regular weekly luncheon and meeting of the Eastern Division of the Salesmen's Association of the Paper Industry, to be held next Monday in the Empire Room of the Hotel Lexington, New York.

Connecticut Paper Merchants Meet

Arthur H. Lewis, newly elected secretary of the Eastern States Paper and Bag Distributors Association, addressed a meeting on Monday last of the newly reorganized Connecticut Paper Merchants Association of New Haven at the Hotel Garde in New Haven. Edward F. Melia, executive secretary of the Paper and Bag Manufacturers Institute of Philadelphia was also a guest. Mr. Lewis explained in detail the purposes of the association, and it was unanimously agreed that this association become a unit of this group to be known as the Connecticut Paper Merchants Association. S. S. Rhodes, of Standard Paper Company, Waterbury, Conn., was elected chairman of the Connecticut association. Representatives from sixteen member houses were in attendance. Mr. Rhodes is a member of the Regional Board of Directors of the Eastern States Paper & Bag Distributors Association. Mr. Rhodes gave a very interesting talk, and, in part, said: "I feel that one of the most progressive steps the paper and bag merchant has taken for many years is made with the formation of the Eastern States Paper and Bag Distributors Association. We, in Connecticut, are heartily in favor of the movement and pledge our whole-hearted support of this idea. We will do our best to promulgate this movement and are glad to become a link in the chain of the jobbers association."

Rex Vincent with Bulkley, Dunton

On April 1, 1937, Rex Vincent of Chicago will become associated with the Bulkley, Dunton Pulp Company, Inc., as a pulp technician.

Mr. Vincent is a member of the Technical Association of the Pulp and Paper Industry and is well known in the Middle West, having been associated with several paper mills as chief chemist. Up to recently he has been employed by the Container Corporation of America as assistant superintendent at the Coated Board Division of the company at Chicago.

In his new work Mr. Vincent will serve Bulkley, Dunton and customers in a cooperative effort to improve the use application of the various grades of pulp distributed by the pulp company. He will also assist in the proper selection of grades to be supplied for a particular use requirement, commensurate with conditions and equipment.

As a pulp technician, Mr. Vincent will also function for the benefit of pulp mill connections by special study and research to improve their understanding of local conditions affecting customer requirements and to advise pulp mills on quality changes necessary to keep abreast of paper mill progress.

Mr. Vincent will make his headquarters at the Chicago office of the Bulkley, Dunton Pulp Company, Inc., 80 East Jackson Blvd., under the direction of Roger Egan.

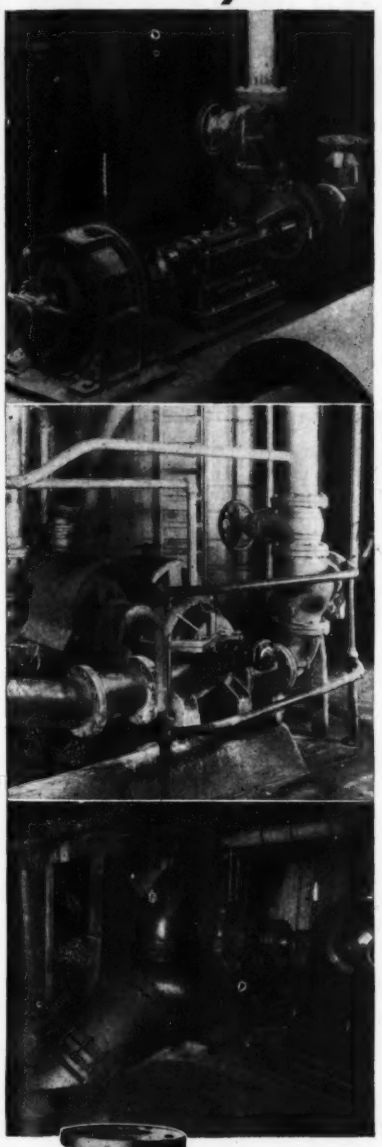
New Gummed Tape Plant

MINNEAPOLIS, Minn., March 15, 1937 — The Midwest Paper Products Company has been formed to manufacture gummed sealing tape, gummed cloth tape, adding machine rolls and carton stay tape.

The new company, of which J. E. Reavis is president, and John T. Arveson, vice-president — the latter being an experienced gummed tape engineer — has established its plant at 412 Sixth Avenue South.

Equipment for the factory was all made in Minneapolis and embodies new ideas in production. The plant will have a capacity of 2½ tons of tape and rolls a day.

PUMPING COSTS GO DOWN
when you have THE RIGHT PUMP *for the JOB*



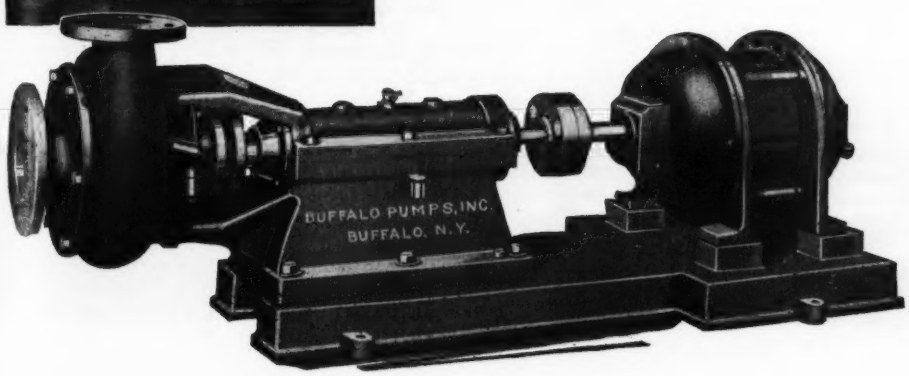
• "Buffalo" Chemical Service Ball Bearing Pumps are setting new performance records every year, and they should — because every "Buffalo" Pump is engineered to do the special job for which it will be used. So if you want better performance on your chemical pumping jobs, fewer shut-downs, longer pump life, and lowest maintenance cost, don't be satisfied with "any pump," but call in a "Buffalo" engineer and he will see to it that you get the right pump for the job.

Literature on our complete line of "Buffalo" Pumps gladly sent on request.

BUFFALO PUMPS, INC.
443 Broadway Buffalo, N. Y.

Branch Engineering Offices in Principal Cities

In Canada: Canada Pumps, Ltd., Kitchener, Ont.



"Buffalo"
CHEMICAL SERVICE BALL BEARING PUMPS

The Story of Paper

The billion dollar paper industry of America owes its modern development to the lowly wasp, for it was this insect which first taught men how to make paper out of wood, Harry R. Daniel said in the Department of Commerce broadcast on "The Paper Industry," over Columbia Broadcasting System recently.

Toward the middle of the last century, the demand for paper became so great, Mr. Daniel said, that the supply of raw material became inadequate. Although scientists often had observed the female wasp making paper in the construction of her nest, it remained for Frederick Keller, a German scientist, to turn the lesson of the wasp into practical usage. He produced the first machine for grinding wood into pulp and this became the turning point in the march of the paper industry to its present tremendous proportions.

Today the use of wood has made the paper industry one of the most important activities in the whole family of American business, employing more than 125,000 workers directly in the paper mills of the country. This figure does not include thousands more who are given work in the distribution of paper products or who bring the raw materials from the forests to the mills.

"I am told that if all the paper used by American newspapers in one year were wound in one standard roll 72 inches wide, it would reach to the moon and back—75 times," Mr. Daniel stated.

"The early races of mankind tried to express their thoughts on brick or stone," he said. "I am told, for example, that the custom of leaving calling cards goes back to the stone age, when men lived in caves. If one of these cave men decided to visit the cave next door, he first threw a rock into the mouth of the cave to announce that he was coming. Otherwise, very likely he would have been hit over the head with a club. And, if the neighbor was not at home, it was the cave man's custom to leave the stone with a mark scratched upon it to show that he had called.

"Later, men began to experiment with crude picture-writing upon bits of pottery or stone. Scholars have discovered libraries of ancient books written upon bricks of clay. The people of ancient Egypt were probably the first to find an easier writing material in a plant called the papyrus, and from the name of this plant our modern word paper has come down to us.

"The fundamental process of turning fibers of cellulose into paper, which Ts'ai Lun, a Chinese philosopher, discovered two thousand years ago, is still the basis of practice for the great modern paper industry. The principal difference is that the entire process which the Chinese carried on slowly by hand, now is done by great machines which do all the work in the twinkling of an eye.

"And here is a fact that will interest everyone who loves the woods and the great outdoors. The paper industry today is taking a vital interest in forest conservation. Under scientific forest management as it is being practiced more and more in the United States today, much of the pulpwood comes from the thinning out of the smaller trees that would otherwise be choked out and die. Some of our pulpwood comes from the tops of trees left on the ground by the loggers, and some of it comes from a type of tree which, having matured, would soon decay anyway.

"A nationwide survey already partially completed by the United States Forest Service shows that our present forest area could, under scientific forest management, be made to supply all of our pulpwood requirements indefinitely.

"Prior to the advent of wood-pulp as raw material, paper-makers experimented with all sorts of strange materials—seaweed, cabbage stalks, potatoes, asparagus and bananas, to mention only a few. Many newspapers, of less than a hundred years ago, were printed on paper made from straw, and a story is told about a famous old Philadelphia newspaper which used this straw newsprint. Subscribers in outlying districts complained that they were not getting their papers. It was discovered, upon investigation, that the neighborhood goats were eating the newspapers as fast as they were delivered—I guess the goats wanted to 'digest the news'."

The talk was one of a series of Saturday afternoon broadcasts made by the Department of Commerce over the Columbia Broadcasting System on "Our Great American Industries."

At the close of the broadcast the announcer advised the radio audience that a copy of the talk, "The Story of Paper," might be secured by addressing a postal card or letter to the Forest Products Division, Department of Commerce, Washington, D. C. The statement was also made that should any business man desire special information on the pulp and/or paper industry, the Forest Products Division of the Bureau of Foreign and Domestic Commerce would cooperate to the best of its ability on the matter. It is expected that several thousand requests will be made in answer to this announcement for copies of the "Paper" broadcast.

Government Paper Bids and Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 10, 1937—The Government Printing Office has received the following bids for 143,000 sheets of buff gummed paper: R. P. Andrews Paper Company, at $10.10 per M sheets; Whitaker Paper Company, $8.82; Mathers-Lamm Paper Company, $8.99;; Reese & Reese, Inc., $8.85 and $10.10; Virginia Paper Company, $8.90; Stanford Paper Company, $10.10; J. R. Howarth Paper Company, $8.85; Gauss Paper Company, $9.20; and Barton, Duer & Koch Paper Company, $10.55.

The following paper awards have been announced by the Printing Office:

The Mathers-Lamm Paper Company will furnish 57,500 pounds (500,000 sheets) of 50 per cent rag, 38x48" light weight high M. F. book paper at 11.43 cents per pound. Reese & Reese, Inc., will furnish 43,600 pounds (300,000 sheets) of 34x44" supercalendered book paper at 5.55 cents per pound and the Whitaker Paper Company will furnish 2,000 sheets of 24x36" brown cloth lined paper at $133.13 per M sheets. Bids for all of these items were received on February 19.

The R. P. Andrews Paper Company will furnish 15,350 pounds (50,000 sheets) of 38x48", 50 per cent rag double coated book paper at 15 cents per pound and the Old Dominion Paper Company will furnish 9,900 pounds (75,000 sheets) of 26x34", 50 per cent rag white bond paper at 13.389 cents per pound. Bids for these items were received on February 15.

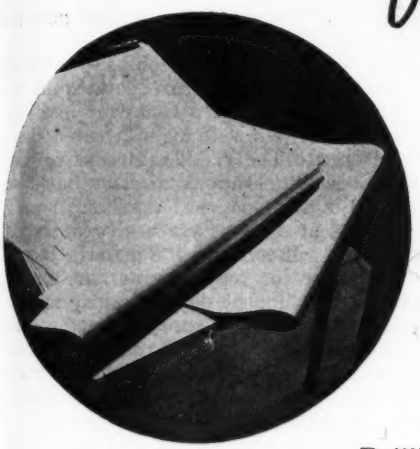
The Whitaker Paper Company has been awarded the contract for furnishing the Government Printing Office with 143,060 sheets of 19½ x 26½ inch buff gummed paper at $8.82 per M sheets, bids for which were received on February 26.

Alexander Bros. Issue New Catalog

Alexander Bros., Inc., manufacturers of leather belting and industrial leathers, of Philadelphia, Pa., have just issued a new illustrated catalog.

This book contains valuable statistical information which may be used to great advantage by plant superintendents, operation managers and purchasing agents.

The new measure of PAPER VALUE Calls for:



OPACITY
WHITENESS
BRIGHTNESS

PROPERLY used, Titanox pigments will give these qualities to your paper to a marked degree. It is the high refractive index, brightness, neutral white color, fineness and easy dispersion of these modern pigments which make possible this new measure of paper value.

Brilliant white obtained by the use of Titanox pigments is permanent. It will not discolor nor darken because these pigments are chemically stable. Their great hiding power effectively masks any discoloration caused by other constituents of the sheet.

Especially important to manufacturers is the fact that the opacity, whiteness and brightness of catalogue, magazine and other light weight stocks are definitely improved by Titanox pigments.

If you desire technical advice on how these desirable characteristics may be obtained most economically, our Paper Service Department will gladly cooperate.

Applicable to all types of Paper Stock

TITANOX-A
(Titanium Dioxide)

TITANOX-B and B-30
(Titanium Barium Pigments)

TITANOX-C
(Titanium Calcium Pigment)

Each Titanox pigment has specific uses

TITANIUM PIGMENT CORPORATION
SOLE SALES AGENT
111 Broadway, New York, N. Y. Carondelet Station, St. Louis, Missouri
National Lead Company (Pacific Coast Branch), 2240 24th Street, San Francisco, California

TITANOX
TRADE MARK

Paper Prices Higher In Boston

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 15, 1937.—The price situation and the difficulty in securing stock from the mills are paramount factors among paper jobbers, while the volume of orders for both fine and wrapping paper is estimated to be maintained on the whole as well as it has been since the first of the year. Various paper manufacturers have been advancing prices and there are indications that values will continue to rise. Some mills are selling paper on condition that the price will be that which is current at the time of shipment. Jobbers have been notifying their customers in regard to the increases. If wholesalers are unable to secure material desired, they are "left out in left field," according to one of them. so that the situation is acute. Printers are hurrying to cover for their requirements or prospective requirements.

The situation, however, will cure itself "when the craze of buying is over and prices may start to come down," intimates a wholesaler.

Conditions in the pulp market, which have been previously outlined in these columns have a big influence on the situation. Mills are trying to protect themselves against the pulp situation. Some of them have shut down on account of the scarcity of pulp. In some localities mills are buying pulp from each other. "It is a tight situation and is going to be tighter." At one time, pulp was selling at $40 a ton, recently at $60, now around $89 to $90, with $100 offered. Buyers can occasionally obtain a carload here and there. The situation resembles that prevailing during the World War.

The box board situation is favorable, with prices strong and advancing. Filled news board has been marked up to 47.50 @ 50.00 from 45.00 @ 47.50, chip board to 45.00 @ 47.50 from 42.50 @ 45.00, single manila lined chip to 55.00 @ 60.00 from 52.50 @ 57.50, single white patent coated news board (bender) to 67.50 @ 75.00 from 65.00 @ 70.00, and binder boards (standard grade) to 75.00 from 70.00, all delivered New England points.

Prices of paper stock continue very firm, with a few exceptions, several grades advancing. Every grade of paper stock is said to be moving, although foreign rags are too high on the other side for much activity in them here. In old papers, mixed papers, old newspapers and corrugated boxes went up rather suddenly in the Boston market on account of price advances in New York and Philadelphia. Mixed papers rose to .55 @ .60 from .47½ @ .50, old newspapers to .60 @ .62½ from .52½ @ .57½, and corrugated boxes to .82½ from .65 @ .70, all f.o.b., Boston. It is expected, however, that at this season of the year, collections will be large at high prices, so that with a big accumulation on hand, prices, naturally, will go down.

In bagging, foreign manila rope advanced to 4.25 @ 4.50 from 3.90 @ 4.00, foreign gunny No. 1 to 2.35 @ 2.50 from 2.25 @ 2.35, scrap sisal to 2.50 @ 2.60 from 2.40 @ 2.50, and scrap sisal for shredding to 2.75 @ 2.90 from 2.60 @ 2.75, all f.o.b., Boston.

Under new domestic rags, new white No. 1 shirt cuttings went up to .09 @ .09¼ from .08¾ @ .09, new white shirt cuttings No. 2 to .06¼ @ .07 from .06 @ .06½, Silesias No. 1 to .07¾ @ .08 from .07¼ @ .07½, soft unbleached shirt cuttings to .09½ @ .09¾ from .09¼ @ .09½, and blue overalls to .07½ @ .07¾,, all f.o.b., Boston. Old domestic rags remained unchanged in price, although roofing stock had a somewhat easier tendency, with less demand.

In foreign rags, old fustians advanced to 2.85 @ 3.00 from 1.75 @ 2.85 and old linsey garments to 2.65 @ 2.90 from 2.65 @ 2.85, all f.o.b., Boston.

The Farnsworth System Is Transferred to The W. J. O'Brien Co.

The Bagley & Sewall Company, of Watertown, N. Y., has completed arrangements for transfer of the Steam Department, formerly the Farnsworth Company, to the W. J. O'Brien Company of Syracuse, where it will be operated independently by the Syracuse organization.

George Onfrey, of Watertown, formerly secretary of the Farnsworth Company and later of the Bagley & Sewall Steam Department, will become affiliated with The W. J. O'Brien Company.

Office equipment and records have already been moved to Syracuse. Manufactured parts and heavy pieces of equipment will be held in Watertown for shipment as these are sold out, according to W. J. O'Brien, president of the Syracuse organization.

Until the death of F. C. Farnsworth in 1933, The Farnsworth Company was one of the leading manufacturers of Paper Mill Drainage and Steam Equipment and now has installations in all parts of the world.

Taken over by The Bagley & Sewall Company after the death of Mr. Farnsworth, it had been operated as the Steam Department of the Watertown Company and supplemented the paper mill equipment manufactured there. The transfer of this unit to The W. J. O'Brien Company will not affect the present operations of The Bagley & Sewall Company, it is understood.

W. J. O'Brien, president of the Syracuse organization, has announced that they will continue the manufacture of the Farnsworth equipment for replacements and repairs, and that a completely new line of paper drainage equipment will be manufactured in Syracuse where the company has the facilities of one of the most modern machine shops, brass and iron foundries in Upper New York State.

As head of The W. J. O'Brien Company, Mr. O'Brien continues the active participation in the manufacture and sale of paper mill equipment which he started as proprietor of The O'Brien Steam Specialty Company in 1920. He is a member of the Technical Association of the Pulp and Paper Industry, the National Association of Power Engineers, the Syracuse Chamber of Commerce and Kiwanis.

Associated with Mr. O'Brien in The W. J. O'Brien Company, besides Mr. Onfrey, is Philip Silverman, graduate of the New York State College of Forestry and specialist in paper and wood pulp manufacture. C. A. Woodruff, of Rochester, N. Y., Consulting Engineer for Lawless Paper Company, Foster Paper Company, Garlock Packing Company and other central New York mills, has been retained by The W. J. O'Brien Company for consulting service in the new organization.

Incidentally, The W. J. O'Brien Company has just announced an indicating dial thermometer designed for installation on any paper machine drier without alteration of existing drainage system or controls.

New Plant for Westvaco Chlorine

The Westvaco Chlorine Products Corporation, 405 Lexington Avenue, New York, N. Y., manufacturer of liquid chlorine and other chemicals used in the paper and allied industries, has awarded a general contract to the H. K. Ferguson Company, Hanna Building, Cleveland, Ohio, for a new plant at Newark, Cal., where the company has recently acquired the plant and business of the California Chemical Company, and will operate as a unit of organization. The new plant will consist of a group of seven buildings, and is estimated to cost close to $1,000,000, with equipment.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Corning, N. Y.—The Corning Fibre Box Corporation, Hammel street, manufacturer of corrugated fiber boxes and containers, has plans nearing completion for new addition to plant, to be one-story, estimated to cost close to $50,000, with equipment. It is expected to ask bids on general erection contract at early date. A. N. Tietzel, 66 East Market street, Corning, is architect.

Tonawanda, N. Y.—Tonawanda Boxboards, Inc., Clayton and Tonawanda streets, a division of the Robert Gair Company, Inc., 155 East Forty-fourth street, New York, N. Y., manufacturer of boxboard products, corrugated and solid fiber boxes and containers, etc., has work under way on new addition to plant, on which superstructure was begun a number of weeks ago, as previously reported in these columns. It will be used for storage and distributing service, and is estimated to cost close to $75,000, with equipment. Completion is scheduled late in April.

Houston, Tex.—The Champion Paper and Fibre Company, Inc., Hamilton, Ohio, has tentative plans under consideration for construction of a paper mill in conjunction with new pulp mill now in course of construction on the Houston ship channel, near Houston, to consist of several large units, occupying an adjoining site. It will be used for production of cardboard and other paper stocks. No estimate of cost has been announced. Company will make decision regarding projected new plant early in the spring. Reuben B. Robertson is executive vice-president.

Everett, Wash.—The Soundview Pulp Company, manufacturer of bleached sulphite pulp products, has awarded general contract to the Austin Company, Dexter-Horton Building, Seattle, Wash., for construction of new additions to mill, comprising plant unit No. 3, recently referred to in these columns. Work is scheduled to be placed under way at once, with completion early in July. New additions will be erected to three present mill structures and in machinery installed for large increase in present capacity in acid plant, digester department, screening and bleaching divisions, filter department and other divisions. Entire project will cost close to $1,300,000. The same building contractor has recently completed the second unit at the mill, and this is now being placed in service. Leo S. Burdon is general manager.

Palmyra, Mich.—The Simplex Paper Corporation, manufacturer of insulating and building papers, chipboard and kindred products, is running on a capacity 24-hour production schedule at mills at Adrian and Palmyra, giving employment to about 350 persons at the two mills. It is expected to hold to this basis of output for an indefinite period. The first noted plant at Adrian, aggregating about 40,000 square feet of floor space, is used for processing and die-cutting of products from the Palmyra mill, as well as materials secured from outside sources of supply. The Palmyra plant, totaling about 25,000 square feet of floor space, is utilized for paper production. A. H. Wood is vice-president and general superintendent.

Holyoke, Mass.—The United Folding Box Company, Inc., Third Level Canal, manufacturer of folding paper boxes and containers, recently organized with capital of 100 shares of stock, no par value, plans operation of local mill. Frank E. Button, Holyoke, is president and treasurer.

West Groton, Mass.—The Groton Leather Board Company, manufacturer of paper board products, has plans under way for a new boiler house at mill, to be one-story, 25x50 feet, estimated to cost about $45,000, with equipment. Boiler units, pumps and auxiliary equipment will be installed. Albert B. Franklin, Inc., 38 Chauncy street, Boston, Mass., is consulting engineer and will take bids on general contract at early date. W. L. Sheedy is president.

Jacksonville, Fla.—The National Container Corporation has been incorporated under Delaware laws with capital of $750,000, to take over and succeed to the company of same name with plant at Review and Borden avenues, Long Island City, New York, N. Y., manufacturer of corrugated boxes and containers. The new corporation will be headed by same officials as former organization, with Samuel Kipnis, president, and is arranging for early financing in form of a bond issue to total about $2,000,000. The proceeds will be used for construction of proposed new kraft pulp and paper mill at Jacksonville, recently referred to in these columns, and for which plans are being consummated. As previously reported, company is acquiring property on Talleyrand avenue, Jacksonville, for new plant, which will comprise several large one and multi-story units, equipped for initial capacity of about 200 tons per day. It is proposed to begin work on project at early date.

Cincinnati, Ohio—The Palm Brothers Decalcomania Company, 3736 Regent avenue, Norwood, Cincinnati, manufacturer of decalcomania transfers and allied paper specialties, has asked bids on general contract for new two-story and basement addition, 28x43 feet, to be used primarily for general operations and office service. It is proposed to award erection contract and begin superstructure soon. No estimate of cost has been announced. Samuel Hannaford & Sons, Dixie Terminal Building, are architects.

Neenah, Wis.—The Kimberly-Clark Corporation, manufacturer of heavy paper stocks, colored papers, etc., has awarded general contract to the Koepke Construction Company, Appleton, Wis., for proposed new four-story addition to mill, 86x254 feet, recently referred to in these columns, and for which superstructure will be

placed under way soon. The award also covers a one and two-story structure, 133x183 feet. First noted building will be used primarily for storage and distributing service, and last mentioned structure for enlargements in the machine department at mill. Entire expansion will represent an investment of close to $500,000. The company will make improvements and alterations in mill at Kimberly, Wis., and has awarded general contract for this work to the Benjamin B. Ganther Company, 78 State street, Oshkosh, Wis.; the program will be carried out at building No. 34. No estimate of cost has been announced.

Monroe, Mich.—The River Raisin Paper Company, manufacturer of corrugated board products, chip boards, box boards, etc., has tentative plans under consideration for a new sewage disposal plant at local mill, to provide for large waste capacity. No estimate of cost has been announced.

Syracuse, N. Y.—The Lowman Folding Box Corporation, 156 Solar street, manufacturer of folding paper boxes and containers, has completed plans for new addition to local plant, to be one-story, estimated to cost about $45,000, with equipment. It will be used primarily for expansion in storage and distributing divisions. General contract has been let to the Universal Building Construction Corporation, 218 West Fayette street, Syracuse, and superstructure will be placed under way at once. G. Young, 205 Davis street, is architect.

Macon, Ga.—E. I. du Pont de Nemours & Co., Inc., du Pont Building, Wilmington, Del., has taken options on large tract of land near Macon, as site for new mill for its cellulose rayon division. Company engineers are making investigations of locality and land, and early decision will be made. Proposed plant will consist of several large one and multi-story units, with ultimate facilities for employment of over 3000 persons. It will represent an investment in excess of $1,500,000, including buildings and equipment.

New Companies, Etc.

Chicago, Ill.—Chicago Carton Company has been incorporated under Delaware laws with capital of 5470 shares of stock, no par value, to manufacture paper boxes and containers of various kinds. New company will take over and succeed to the concern of same name, with local plant at 4200 South Pulaski street. The incorporators include James T. Mullaney and Chester L. Butler, both of Chicago; and Robert C. Baker, Evanston, Ill.

New York, N. Y.—The Empire State Loose Leaf Corporation has been incorporated with capital of $10,000, to manufacture and deal in commercial paper goods, loose leaf stocks and systems, etc. New company is represented by Leon Shapiro, 274 Madison avenue, New York, attorney.

Cleveland, Ohio—The Dobeckmun Company, 3301 Monroe avenue, manufacturer of cellophane products, operating a local converting plant for production of wrapping materials of this character, has arranged for stock issue of 40,000 shares of stock, with maximum offering price of $20 per share, the proceeds to be used for general financing and additions to working capital.

Waterbury, Conn.—The Waterbury Tag Company has been incorporated with capital of $50,000, to manufacture and deal in paper tags, labels and kindred paper products. The incorporators are Edward T. Carmody, Daniel C. Ryan and Maurice T. Healey, Jr., 111 West Main street, Waterbury.

I. P. RECAPITALIZATION PLAN

(Continued from page 19)

each of all other classes of stock vote in favor, the plan may be carried through by omitting the change of each share of 6 per cent cumulative preferred into one share of 5 per cent cumulative convertible preferred and ¾ths of one share of common, and leaving the 6 per cent preferred outstanding as at present.

It is proposed that International Paper reduce stated value of its 1,000,000 shares of common stock to $15 per share from $52.50 to eliminate the deficit, which at December 31 was $27,100,000, and leave a surplus of $10,400,000.

The 5 per cent cumulative convertible preferred stock will be redeemable at 105 a share and will be entitled on liquidation or termination in priority to the common stock to receive in cash $100 a share.

Last Year's Profits

Report of International Paper and Power Company and subsidiaries (excluding International Hydro Electric System and subsidiaries) for year ended December 31, 1936, shows net profit of $4,786,241 after interest, amortization, depreciation, depletion, provision for doubtful accounts, dividends accrued but not being paid currently on preferred stocks of subsidiaries, federal income taxes and $6068 federal surtax on undistributed profits, equivalent to $5.26 a share on 909,855 shares (par $100) of 7 per cent preferred on which there is an accumulation of unpaid dividends, excluding 4891 shares in treasury. This compares with net loss of $3,323,432 in 1935.

Deficit from operations as of December 31, 1936, was $19,976,022, against deficit of $12,326,510 at end of 1935.

Current assets December 31, 1936, including $5,345,467 cash, were $46,500,338 and current liabilities $10,938,553, against cash of $3,206,108 current assets of $44,161,665 and current liabilities, including $16,227,659 notes payable, of $26,657,783 at end of 1935.

New Transmission Belts Folder

An Album of Familiar Belts, a folder containing twenty-five reproductions of photographs taken in the field and in the factory has been released by United States Rubber Products, Inc.

These pictures show interesting and unusual installations of Transmission Belts in a variety of industries, as well as a number of exceptional studies made by Margaret Bourke-White, chief photographer for *Life*, the new picture magazine, at U. S. Rubber's Passaic Laboratory and Factory. The latter pictures give readers an abbreviated but highly interesting tour of this modern, up to date, transmission belt factory.

Complete information pertinent to the installation or describing the process pictured is contained on the back of each picture.

CE Bent-Tube Boilers

Combustion Engineering Company, Inc., New York, has just issued another of its series of equipment catalogs. This covers its extensive line of CE bent-tube boilers, many pages being devoted to cross-sections of typical installations of various types, in addition to descriptive matter, photographs of furnace and boiler details, and shop views showing the fabrication of high-pressure, fusion-welded drums from the bending of the plate to the finished product, including X-ray examinations. The catalog is printed in two colors and is attractively illustrated.

313 MILES OF PAPER PER DAY FROM ONE MACHINE

TO PAPER MILL EXECUTIVES INTERESTED IN MORE OUTPUT

So high is the speed with which this new paper machine operates that one day's output is equivalent to the length of a 19-foot highway across New York State, from Albany to Niagara Falls—with ten miles left over. A new kraft paper-machine operating at a speed of 1100 feet per minute!

This machine, which is equipped with a General Electric drive and control system, is in the Union Bag and Paper plant at Savannah, Georgia, where, despite newness of equipment, production records are being made right and left.

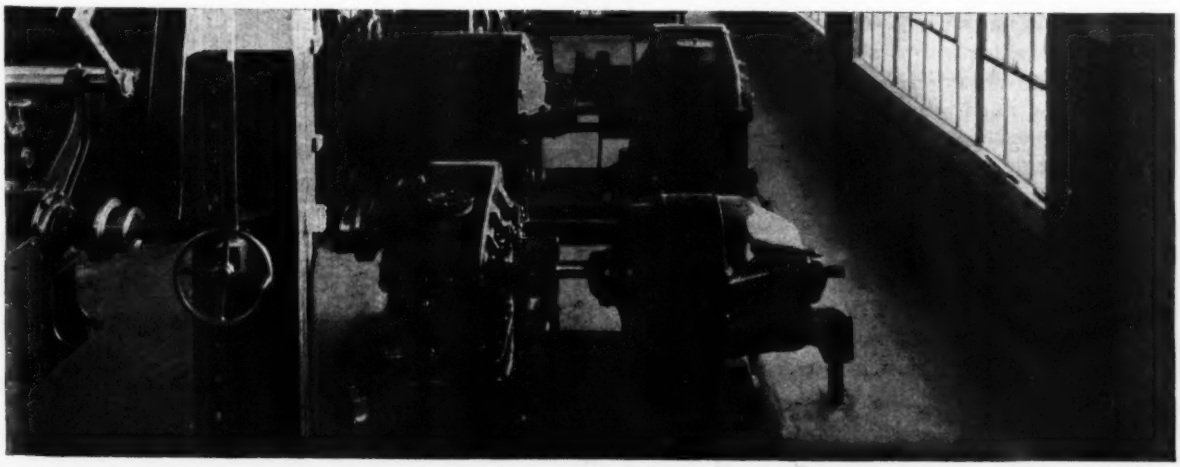
In addition to this first machine, Union Bag and Paper is already preparing to install second and third units of the same size.

General Electric generating and distribution equipment and the General Electric system of sectional drive were chosen for these remarkable installations.

Use of General Electric equipment assures:

(1) High speed output
(2) Accurate and convenient control
(3) Adequate power, economically applied

In planning your mill modernization or extensions of your present plant, let General Electric co-operate with you. G. E. furnishes modern, cost-saving equipment for papermaking processes—equipment that helps make possible greater output and improved quality. General Electric, Schenectady, N. Y.



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GENERAL ELECTRIC

PAPER TRADE JOURNAL
ESTABLISHED 1872
Reg. U. S. Pat. Off.

George S. Macdonald, Pres. *Joseph P. Horgan, Secy.*
Executive and Editorial Offices, 15 West 47th St., New York, N. Y.

Henry J. Berger, *EDITOR*
Herbert J. Laughton, *Associate Editor*
Ronald G. Macdonald, *Editor Technical Section*
Lynne M. Lamm, *Washington Correspondent*

Price, Per Copy, 10 Cents — United States, Per Annum, $4.00
Canada and Foreign Countries in Postal Union, $6.00

Member Audit Bureau of Circulations

Vol. CIV New York, March 18, 1937 No. 11

COMING EVENTS IN THE PAPER INDUSTRY

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—Fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Annual Meeting, Springfield, Mass., June 23-25.

LABOR AND RECOVERY

The recent strike in the automobile industry was one of a series of developments illustrating the vital importance of the labor situation as a factor in the general problem of recovery, states the Guaranty Trust Company of New York in the Current issue of *The Guaranty Survey*, its monthly review of business and financial conditions in the United States and abroad.

"To a certain extent, the existing labor unrest is characteristic of periods of recovery after severe depressions. The wage reductions that become necessary in hard times are always accepted with reluctance, and there is a strong tendency to attempt to recoup the losses at the first opportunity. Even where wage cuts have not been a serious factor, the realization that business earnings are increasing is often enough to lead to a desire on the part of labor to share as fully as possible in the reviving prosperity.

"In some cases, a rising cost of living is an important element in the situation. This does not appear to have been true in the present instance, although the marked advances in commodity prices in the last few months suggest that it may become so. It is evident that the labor unrest in various branches of industry at present threatens to place serious impediments in the path of recovery, to the ultimate detriment of labor itself, as well as of other groups. Perhaps the greatest hope of avoiding grave consequences lies in the possibility that all parties concerned may become more clearly aware of the real nature of the problem.

"The primary and ultimate purpose of all labor movements is to increase the real wages of workers—not money wages, but wages expressed in terms of food, clothing, shelter, and the other commodities and services that the worker buys. Unionization, collective bargaining, and the other objectives for which labor strives are means to that end, not ends in themselves. If real wages are considered in their true light, as the share of the aggregate output of goods and services available for consumption by workers, it is evident that they can be increased in only two ways: first, by taking away a part of the share that would otherwise go to capital; and second, by increasing the total amount available for distribution. Collective bargaining, strikes, and the other devices by which workers try to augment their earnings are designed to obtain a larger share from other groups and are related only indirectly, if at all, to the question of increasing productivity. In fact, they are often calculated to diminish, rather than increase, the aggregate output by reducing hours, opposing the 'speed-up' of operations, and similar policies.

"Constructive policies in labor leadership must be based on the realization that the earnings of workers are necessarily limited by the amount of goods and services available for consumption. Even under the most favorable conditions, the gains in real wages that can be achieved by means of strikes are strictly limited. At the same time, the direct and immediate consequence of strikes is to halt operations and reduce productivity, and thus to dry up the source from which substantial and permanent advances in real wages must be derived.

"In the endless struggle to improve the condition of the working population, the productivity of industry is the vital factor. It is the increase in productivity that has brought about the extraordinary rise in standards of living throughout the world during the modern industrial era. And future progress in the same direction must be brought about in the same way. Certainly the welfare of labor is among the most important objectives of civilized society and is of vital concern to other groups, as well as to labor itself; and all activities that can genuinely and permanently contribute to that welfare are worthy of encouragement. But the fundamental factor in determining the level of real wages is the productive efficiency of the wage-earner. The only way to raise standards of living is to lower labor costs by increasing output per capita.

"This consideration throws light on the question of arbitrarily shortening working hours in order to provide employment. The agitation for measures of this kind is not based on the view that labor needs more leisure but that more laborers need jobs. As a temporary device to apportion a given amount of employment among a larger number of workers, the plan might have some of the desired effects, although its usefulness would be limited in practice by the serious disruption that it would entail in established operating procedures and methods. But it should be clearly recognized that whatever temporary gains it might bring to workers now unemployed would be achieved primarily at the expense of other

workers. And in the long run its effect could only be to reduce the aggregate productive capacity of labor and capital and hence the potential level of real wages.

"The wisdom of such expedients becomes even more questionable when consideration is given to the possibilities for reemployment through the operation of normal economic forces. Recent studies tend to show that 'technological' unemployment—that is, unemployment due to the displacement of workers by machines—is a much less important factor in the present labor situation than is commonly supposed. Current unemployment is due primarily to two factors: first, the failure, thus far, of business activity to regain pre-depression levels; and second, the growth of the potential working population in recent years. Both of these factors can be roughly summed up in the statement that output per capita has not yet been restored to the pre-depression level.

"Further possibilities of reemployment lie in the development of new industries, new products, and new uses for existing products. Research in the last few years has revealed many opportunities along these lines. New industries increase the demand for labor and the output per capita without necessarily creating even temporary unemployment.

"The rate at which reemployment takes place will depend in no small measure on the ability of labor, business, and government to approach their common problems in a spirit of cooperation based on a recognition of the realities of the situation. For the points at which the interests of economic groups coincide are much more numerous and much more vital to the welfare of all than the points at which they diverge. This is the central fact in any consideration of the labor problem, and if it is continually borne in mind a long step will have been taken toward surmounting the difficulties that threaten to retard further business recovery."

Mead Corp. Registration

In connection with the registration by The Mead Corporation of $10,000,000 fifteen-year 4½ per cent First Mortgage Bonds due April 1, 1952, and 40,000 shares of no par value, Series B, $5.50 Cumulative Preferred stock with warrants, it has been learned that it is proposed to use the estimated net proceeds approximately:

To retire on May 1, 1937, all of the Corporation's outstanding First Mortgage 6 per cent Bonds.

To increase to $500,000 its present investment in the capital stock of Brunswick Pulp and Paper Company, a Delaware Corporation, which has under construction a pulp mill at Brunswick, Ga., and to reimburse the treasury of the Corporation for its present investment therein.

To increase to $1,000,000 its present investment in the capital stock of St. Joe Paper Company, a Florida corporation, which has under construction a pulp and paper board mill at Port St. Joe, Florida, and to reimburse the treasury of the Corporation for its present investment therein.

For machinery and equipment at its plants at Kingsport, Tennessee; Chillicothe, Ohio, etc., and for increasing its working capital.

Production Ratio Report

The following statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3%(c)	76.1%	65.8%	.....
February	89.8%(c)	77.9%	70.0%	.....
March	.. ..	76.0%	70.5%	.....
April	.....	82.3%	70.0%	.....
May	.....	81.6%	69.4%	.....
June	.....	80.7%	72.3%	.....
July	.....	77.3%	64.9%	.....
August	.....	81.5%	70.9%	.....
September	.....	80.5%	71.9%	58.2%
October	.....	87.6%	75.6%	64.7%
November	.....	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average	.....	81.3%	70.5%	.....
Year to date First 9 weeks	89.9%(c)	76.9%	67.7%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1937		CORRESPONDING WEEKS, 1936	
*February 6	88.1%(c)	February 8	77.5%
*February 13	89.5%(c)	February 15	77.0%
*February 20	90.4%(c)	February 22	78.5%
*February 27	91.3%(c)	February 29	78.7%
*March 6	87.4%(c)	March 7	79.4%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks				
Ratio Limits	Feb. 6, 1937	Feb. 13, 1937	Feb. 20, 1937	Feb. 27, 1937	Mar. 6, 1937
0% to 50%	48	36	37	38	30
51% to 100%	267	279	276	268	184
Total Mills Reporting	315	315	313	306	214

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported on January 4, 1937 Machine Improvement Survey.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours", were as follows:

Months	1937	1936	1935	1934	Months	1937	1936	1935	1934
Jan.	78%	61%	61%	....	July	....	69%	59%	....
Feb.	....	67%	67%	....	August	....	75%	65%	....
March	....	68%	67%	....	Sept.	....	76%	69%	62%
April	....	70%	61%	....	October	....	82%	76%	63%
May	....	68%	61%	....	Nov.	....	79%	70%	56%
June	....	68%	65%	....	Dec.	....	74%	60%	52%

Week ending Feb. 6, 1937—86%
Week ending Feb. 13, 1937—86%
Week ending Feb. 20, 1937—85%
Week ending Feb. 27, 1937—86%
Week ending March 6, 1937—86%

Registration Statements Filed

WASHINGTON, D. C., March 10, 1937—The Soundview Pulp Compaany, of San Francisco, Cal., has filed a registration statement with the Securities and Exchange Commission covering 69,750 shares of $5 par value common stock, and warrants evidencing the right to purchase the common stock.

The stock was offered to stockholders of record February 17 at $22.50 a share on the basis of one share for each six shares held. The warrants will expire on March 15. Any remaining shares up to 20,000 are to be offered to certain stockholders, it is stated. The proceeds are to be used for plant additions and to discharge indebtedness.

The Scott Paper Company, of Chester, Pa., also filed a registration statement with the Commission covering $4,000,000 of 3¼ per cent debenture bonds due March 1, 1952 and convertible until March 1, 1942, and an undetermined number of shares of no par value common stock to be reserved for conversion of the bonds, and 568,000 warrants for the purchase of the bonds to be issued to stockholders. Such of the bonds as are not taken by the warrant holders will be offered publicly through underwriters. The proceeds are to be used to purchase securities of the Brunswick Pulp and Paper Company, to reimburse the company for capital expenditures, and for working capital.

It's PRECIOUS LIQUOR to Jim Lester

•

THERE'S more to Jim Lester's job in Mathieson's plant at Saltville, Virginia, than just filling liquid caustic tank cars. His is the task not only to see that cars are properly filled, but to make sure that each car interior is clean and free from defects before filling, that pipe lines, valves, pumps are all in perfect condition. On him rests a goodly share of the responsibility for the uniform purity of Mathieson Liquid Caustic when it arrives at your plant.

One reason Jim Lester carries this responsibility so well is his frank respect for the quality of Mathieson Caustic. Throughout the eleven years he has worked at Saltville, this man has watched his company steadily improve its processes, has seen it lead time and again in producing caustic which set new standards for purity and uniformity. With such a background, it is no wonder Jim Lester regards the product in his care as "precious liquor"—no wonder that, like all of the men behind Mathieson Chemicals, he spares no pains to deliver you a dependable product of uniform, outstanding purity.

The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street New York, N. Y.

Send for free 72-page book, "Cutting Costs with Liquid Caustic Soda."

Mathieson Chemicals

SODA ASH . . . CAUSTIC SODA . . . BICARBONATE OF SODA . . . LIQUID CHLORINE . . . BLEACHING POWDER . . . HTH AND HTH-15 . . . AMMONIA, ANHYDROUS AND AQUA . . . PH-PLUS (FUSED ALKALI) . . . SULPHUR CHLORIDE . . . CCH (INDUSTRIAL HYPOCHLORITE) . . . DRY ICE (CARBON DIOXIDE ICE)

Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Instrumentation Studies. VIII.

An Analysis of "Smoothness"

By the Staff of The Institute of Paper Chemistry

Preliminary Investigations

During the year 1933 and prior to the inception of intensive interest in testing equipment, The Institute of Paper Chemistry began an academic study of surface irregularities of paper, both coated and uncoated.

Recognizing the theoretical deficiencies of the Bekk tester and other testing methods then available, a project was inaugurated to explore the possibilities of studying paper surface by a special method, involving lights and shadows produced by grazing incident light passing over the surface. Exercising appropriate experimental precautions, it was found possible to trace the magnitude and frequency of surface irregularities by mounting a photometer over a microscope and moving the specimen with the micrometer stage in front of the objective and taking photometric measurements at intervals of 0.1 mm. steps.

By plotting the visual photometer readings against distance, the topographic map of the path traced out by this procedure was obtained. A distance of several millimeters so plotted was considered as typical of the sheet. To validate the use of photometric measurements, the same areas were traced without the use of the photometer but with the aid of a micrometer focusing screw. Focusing adjustments were made again at 0.1 mm. steps and the actual variations in altitude recorded. Transferring these measurements to a graph of altitude against distance, irregular curves were obtained which agreed remarkably well with those obtained photometrically.

In the academic procedure no thought was given to a technical application, since the study was purely a fundamental one and involved tedious and difficult measurements. Upon the assumption that light at grazing incidence accentuates the irregularities of the paper surface to such an extent that they may be more readily observed or measured, an arrangement was devised for making, not a succession of exact measurements of single variations in roughness, but rather a single measurement on a much larger area of paper. For this purpose a separate panel and attachment were built to be used on a brightness tester. This attachment permits the sample to be rotated through 180 degrees about an axis at 22.5 degrees to the fixed direction of the incident light beam. The angles of incidence and reflectance with the plane of the sheet are both 22.5 degrees. A polarizing prism was placed in front of the photocell, so that no gloss light would affect the measurements. The measurement consisted simply of a comparison of the amount of light reflected to the active photocell when the sample was inclined at 45 degrees to the plane of incidence with the reading obtained with the sample at 90 degrees to the plane of incidence. In a true development of this principle for testing purposes, it would be necessary to design a special set-up which would allow changes in all the angles which affect the measurements.

Measurements were taken with this arrangement on a wide variety of coated papers presented by the Grading Authority for coated book paper and results were recorded and reviewed for the benefit of the technical subcommittee on coated book paper. The possibilities of the method were not, on account of insufficient time available, pursued extensively, and although the data collected on the improvised set-up correlated with a promising degree of regularity with visual smoothness, other instruments, notably the Davis pressure-smoothness instrument, received the vote from the technical subcommittee as inherently, on the basis of evidence then available, the device most immediately worth developing.

A reconsideration of the requirements for surface smoothness testing from many angles leads repeatedly to the apparent necessity of avoiding any principles devised for making a single measurement on a large area of paper as an index purporting to describe the type of surface peculiarities present. As a consequence, it is not to be recommended that any procedure other than an actual topographic tracing of individual irregularities of surface, including the photometric one devised at the Institute, should receive the benefit of extensive development. In the following discussion this position will be more appropriately analyzed.

An unsurmountable fallacy in making a single measurement over an area sufficiently large to include a great number of surface irregularities is that, by such a measurement, it is impossible to discriminate between two surfaces, one of which contains a large number of small variations and the other a small number of large variations. Thus, it would seem to follow that a smoothness testing device applicable to the most exacting demands of code testing for a wide variety of types of paper surface must somehow yield measurements defining the average

frequency and the average magnitude of individual irregularities.

Note:

(The greater part of this report was devoted to a study of the physical principles of the Davis "smoothness" tester and to the design and development of an experimental model of an instrument for the measurement of surface characteristics. However, since the work did not lead to an instrument which could be recommended for the code grading of papers as judged from the standpoint of visual estimation of surfaces, the details of the investigation have been omitted. Some of the conclusions reached will be found in "Instrumentation Studies. X.")

The Smoothness Characteristics of Printing Papers

The surface requirements of printing papers are nearly as varied as the uses to which they may be put. To each type of printing there probably corresponds a type of paper with optimum finish. Under finish will be included all of the surface characteristics of paper which play a part in its printability.

It is very much easier to start with the concept of a perfectly smooth surface. This is a surface without roughness. A similar statement about roughness is entirely without meaning, simply because roughness may occur in such a variety of ways. Optical glass may be polished to give as nearly perfect a smooth surface as anyone could ask for. It will serve as Exhibit A for the perfectly smooth surface. Certainly paper cannot now be manufactured which approaches this upper limit of smoothness.

A perfectly smooth printing paper would probably be very disappointing in its printing quality, due in a great measure to the fact that printing presses depend largely on the roughness of the paper to carry the sheet through the presses. Without some roughness the problem of "register", which continually confronts the printer, would be greatly aggravated. Hence, certain departures from this ideal smoothness are essential to good printing. Unfortunately, these characteristics are not so well and generally known as would be desired. Moreover, there are certain departures from perfect smoothness which can only be counted as manufacturing defects.

It is extremely important, from a grading standpoint, that manufacturing defects be compared with cost accounts in individual mills. A manufacturing defect due to carelessness or poor workmanship in the production department must not be placed on a level with defects demanding additional cost for their rectification. Until such a comparison is made with the cost accounts, it is impossible to know what surface characteristics should be included in considerations of grading. There is no *a priori* certainty that such an investigation would lead to results uniform from mill to mill.

Even mechanically rough surfaces, such as those obtained in ground glass, show a definite surface texture. Not only is the height of the peaks above the depressions important, but also the spacing or frequency with which these occur change the texture of the surface. Likewise in paper, the character of the surface is determined both by the magnitude and by the frequency with which the variations occur.

Before discussing various smoothness characteristics, it is well to recall that a number of paper qualities, not normally associated with smoothness, play fundamental roles in printing as though they were due to smoothness. Among these must be counted *formation* and *compressibility*. A smooth sheet may print poorly due to poor formation, while a rough sheet may print as well as a smooth sheet due to its high compressibility, which makes the paper smooth under the presses.

Coated papers probably display as wide a range of surface characteristics as can be found in any group of printed papers. Certain defects are attributable to the uncoated sheet, certain ones to the coating process, and still others to a combination of these. These defects will be treated in the following discussion according to this division.

TYPICAL SURFACE DEFECTS OF UNCOATED PAPERS

Probably the first and most important surface defect is due to poor *formation*. While formation is not in general considered a surface characteristic at all, half tones often fail to take the ink in close correlation with the variations in formation. This is probably due to *variation in bulk*, meaning that a paper, which may appear quite smooth visually, compresses by unequal amounts under the presses and hence is far from smooth as a printing paper. Variations in bulk also lead to variations in smoothness as estimated visually, particularly if the paper is super-calendered. As the sheet goes through the calender stacks, the hard sections are ironed out under the high pressure, while the spongy sections are merely compressed and then expand again after the nip is passed.

In general, the type and quality of the stock used play a profound role in the type of finish finally obtained. The amount and quality of beating and jordaning greatly influence the finish. Certainly these are variables which greatly affect the cost of the finished paper. Through their control, the formation and compressibility may be varied within wide limits.

Even with the other factors as nearly equal as possible, a sheet with a very high formation and compressibility may not be the most desirable from a printing standpoint. A compressible sheet may lack body, i. e., it may stretch so badly under tension as to distort the printed pattern and quite nullify its other advantages. It seems at best that the finest printing papers must result from compromises of certain quality characteristics in relation to printing conditions and use requirements.

There is probably a very definite correlation between formation and the distribution of fillers in a filled sheet. Poorly formed papers, on the whole, tend to show a much greater variation in the filler retention from spot to spot in the paper. Consequent to this comes a reduction in the printing quality of the sheet. This may further complicate sizing difficulties. Non-uniformities in *sizing* lead to non-uniformities of ink retention on the finished sheet. Where the sheet is poorly sized, ink penetrates the paper and spoils the pattern. If surface is to be judged from the printing results obtained on the paper alone, then *sizing* must be counted a surface characteristic, not of the paper alone but also of the paper in relation to use requirements.

As the stock comes out of the head box, it may carry with it pieces of slime or froth as well as portions of undefibered stock. These, together with deposits of gums and resins, give rise to the so-called "fish eyes" in the finished paper. These are, as the name implies, almond-shaped dark sections in the paper. *Foam* may be present in the stock as it comes from the head box onto the machine wire. In the subsequent manufacturing operation, the foam breaks leaving *foam marks* or *pin holes* in the sheet.

Water and grease may also leave a typical impression on the surface of the sheet. Any small particles of foreign material appearing in a sheet, including dirt, as well as particles of metal, rubber, and vegetable matter which have passed through the screen with the stock, are classed as *dirt* or *specks* and must be counted as surface defects.

Both the machine wire and the press and dryer felts leave characteristic marks on the two opposite sides of the sheet as it is formed, pressed, and dried. These give rise to pronounced wire and felt marks in the finished paper. While these may be nearly ironed out in the drying and finishing operations, the benefits gained may be at too

great a loss in other desirable qualities to justify the process.

Surface wire marks of paper are due to the impression of the wire upon the sheet during the formation of the web. Several factors cause the pattern of the wire marks to be asymmetrical in the comparison between machine and cross directions. Primarily, the nature of the weave makes for a varying spacing of the surface depressions, since the shoot wires are spaced further apart than the warp wires, and the latter are bent around the shoot wires, forming a system of "knuckles" along a line across the direction of the sheet. This series of "knuckles" causes a corresponding series of depressions in the surface of the sheet, which makes for a ribbed appearance across the machine direction. Partly due to unequal shrinkage in the cross and machine directions, the ribs across the machine direction are further apart and more apparent than those which follow the warp wires and run in the machine direction. That is to say, with a 75 mesh wire there would be 76/2=38 depressions per inch along a given shoot wire and 60/2=30 depressions per inch along a given warp wire as the sheet comes to the first press. Stretch during pressing and shrinkage while drying under tension will cause the frequency in the two directions to become even more unequal. Naturally, subsequent processing may tend to eliminate the effect of wire marks, but it is logical to assume that, even so, there is a difference in surface characteristics at points of depression and protuberance.

Pronounced wire marks always appear to form a diamond-shaped pattern on the wire side of the sheet. This is an optical illusion. All that is present in any marked degree is the impression of the "knuckles" of the wire. From the very nature of the wire weaving process, these impressions from the warp wires do lie at the vertices of diamonds. The eye fills in the rest of the diamond and gives the observed effect.

The felt side of the sheet frequently bears noticeable felt marks. Just as the wire leaves its typical impressions, so does the felt. The felt side is often characterized by a marked "tooth." For many purposes this tooth is not counted as a surface defect but lends definite character to the sheet.

A number of factors may lead to *fuzz* formation on the sheet. As the paper goes through the printing press, this may lead to smears and the failure of the paper to take the ink uniformly. If the paper is first coated and then printed, the fuzz fibres may serve as wicks about which the coating material builds up into *pinnacles* or *mounds*.

The characteristic defects of groundwood stocks may show up in the finished paper in the form of shives, splinters, and slivers. Incidentally, it is very difficult to cover these in coated groundwood papers. Their presence is the most evident indication that a coated paper contains groundwood.

Surface Defects Due to the Coating Process

The prime motive behind the coating of paper is to improve the finish of the sheet. The result of the process will depend very largely on the type of equipment and on both the type and quality of coating materials used, as well as on the uncoated paper. Specifications of the chemical nature of the "color" allowable in certain grades of paper would fall far short of specifying the cost or quality of the finished sheet. Additional refining of the coating materials materially improves the quality of the finished paper without at the same time materially changing the values obtained for the paper by any of the ordinary chemical and physical tests. While in uncoated papers additional refining will nearly always result in a change in the value obtained from one or more of the ordinary testing instruments in coated papers, improving the quality by further refining of the coating materials may only be detected by microscopic examination or the use of a sedimentation balance on the materials after the coating is removed from the paper.

The effect of non-uniformities in sizing of the uncoated sheet may show up very much accentuated in the coated sheet. Where the uncoated paper is poorly sized, the binding material for the coating will be absorbed into the uncoated sheet and leave sections of the paper where the pigment will either pick off very easily or soak ink. In certain coating materials, the adhesive forces between the coating and the uncoated sheet are neither strong nor uniform. Because of this, the coating will frequently pick off from the sheet and leave very bad surface defects. If the pigment picks off on the calender stacks, the percentage of rejects in the finishing room should increase. If it picks off or the paper soaks ink on the printing presses, the number of complaints will increase.

As the coated paper goes through the coaters, brush marks, smears, and streaks may be left as a permanent impression upon the surface of the sheet. It would be extremely difficult to remove these by the calendering process even though the calenders were run at relatively high humidity and the paper had a high moisture content.

Bubbles or foam present in the "color" solution as it coats the paper will break and, due to surface tension, form *craters* and *pin holes* in the coating material. These may be particularly bad if they should happen to fall on foam marks present in the uncoated paper. All fuzz fibres present in the uncoated paper serve to form a wick about which a coating material may build up into *pinnacles* or *mounds* in the finished coated paper. Either in this form or after they are crushed by the calender nips, these constitute a distinct surface defect in coated papers. These crushed mounds are often included under the general term "fish eyes." This term seems to be used to include a multitude of sins.

Coated sheets frequently show a *leathery* or a *galvanized appearance*. This leathery effect is probably only a surface defect in the same sense as is poor formation. The presence is much the same as that exhibited in the surface of well-tanned leather. There seems to be a relation between the extent to which the galvanizing effect is present and the formation of the uncoated sheet. The galvanizing effect may be included under the general term "closure." By closure is meant the typical behavior of coated papers during the calendering process, when certain small areas are brought to a high gloss, while adjacent areas remain quite dull. The glossy areas may be very small and frequent, or they may be of considerable extent and spread in a random way over the surface of the sheet, giving the typical appearance of galzanived iron. It is this phenomenon of closure, probably, which has associated "smoothness" with "gloss" in the minds of the paper makers. Gloss and smoothness are essentially distinct features in paper. Gloss is a purely optical quality, while smoothness at best is a combination of optical and mechanical properties of the surface.

Intermediate between a machine finished coated paper and a highly calendered coated paper, there may occur a typical *chalky appearance* of the surface. This appearance is probably due more to the nature of the coating materials and the coating process than to the actual degree to which paper is calendered.

In coated papers to which a large amount of dye of certain types has been added to the "color," a very noticeable mottled appearance may be obtained. While this effect appears to be on the surface of the paper or very

close to the surface, it is not a surface defect in either the strict sense or under printing conditions. However, the mottling effect can accentuate the presence of fuzz fibers extending from the paper. There is no known method by which the mottling can be overcome in the treatment of the paper after it leaves the coater. A higher degree of calendering will make the effect more noticeable.

3. Surface Defects Due to Both the Uncoated Sheet and the Coating

While the calendering process nearly always improves the surface of a paper, as far as smoothness is concerned, the process itself also gives rise to certain defects. If the rolls are not highly polished or bear marks, such as sand marks from the abrasives used in giving them their proper finish, the paper will be given a corresponding impression, which can be designated as *calender marks* or scratches. If it should happen that the paper has folds or creases resultant from any previous stage in the manufacturing process, the paper or the coating will be badly cut as the paper goes through the calender stacks.

A number of factors lead to two-sidedness in uncoated papers. The very method by which paper is formed on the Fourdrinier machine, plus the removal of water by the suction rolls and presses, plus inequalities in the density of mixed fibers, cause the uncoated sheet to be highly two-sided. A number of processes attempt to overcome this, but none is entirely successful. Starting with a two-sided uncoated sheet, it is very difficult to obtain a coated paper which does not continue to show two-sidedness. As an example, it would be very difficult to obtain uniform coating conditions on a sheet having heavy wire marks on one side and no corresponding marks on the other.

Color spots, due both to the uncoated paper and to the coating, may consist of a concentrated mottling effect or to undissolved grains of pigment used for coloring. These are very noticeable by visual observation and may stand out from the surface, although in most cases it is a difference in color and not in surface that is the most noticeable.

In contrast to the chalky appearance previously mentioned, a fibrous appearance is sometimes noticed. This will be particularly noticeable in the uncoated paper, but the same appearance may continue through the coating process.

In almost all grades of paper an increase in the quality and uniformity of the marketed paper may be obtained by increasing the amount and quality of the inspection. This will lead directly to an increase in the quantity of rejects and involve a very substantial increase in the cost of production. It usually turns out in practice that the most care is taken with the highest grade and the least with the lowest grade. This tends to accentuate further the differences in costs between the grades.

Seventh Annual Packaging Show

The paper industry has a vital interest in the Seventh Annual Packaging, Packing and Shipping Conference and Exposition to be held at the Hotel Pennsylvania, New York, from March 23 to 26. This conference is to be held under the auspices of the American Management Association, of which TAPPI is a member.

Among the speakers will be A. V. Shannon of Riegel Paper Corporation, J. D. Malcolmson of Robert Gair Company, Douglas Crocker of The Gummed Industries Association and many other authorities on the subject of packaging.

Over seventy exhibitors, among them many prominent paper manufacturers and converters, are showing their products at the Exposition during the Conference.

Simplified Volumetric Determination of Cellulose in Pulps and Papers

Washington, D. C., March 17, 1937 — Herbert F. Launer, of the Paper Section, National Bureau of Standards, Department of Commerce, has developed improved precedures for determining the amounts of alpha, beta, and gamma cellulose in pulps, rag stock, and papers, which should be of interest to paper chemists, it was announced today.

Alpha cellulose has been shown by investigators at the Bureau and elsewhere to be closely related to the stability of paper. Stable papers for record purposes are characterized by a high content of alpha cellulose, which is recognized as a criterion of stability, it was stated.

A correlation of the beta and gamma cellulose values with the physical properties or stability of papers has not yet been effected; hence the interest in these quantities is as yet more in the scientific field than in the field of practical application, according to the Standards Bureau.

The usual methods of determing the amounts of these cellulose components are essentially gravimetric. The improved method, by which cellulose is determined oxidimetrically with dichromate, is completely volumetric, in that it involves no precision weighings whatever as contrasted with the 28 weighings (for duplicate tests) necessary in a gravimetric method. It is as precise as the gravimetric methods, which are usually the standards of accuracy in chemistry, but has the advantage of being far simpler and shorter, the announcement stated.

Moisture and ash determinations, for example, are not necessary in this method, whereas they are indispensable in all others. The actual working time for four complete determinations is 1½-2½ hrs., which is about ¼ to ⅛ of the time required by a gravimetric procedure. The gravimetric methods require samples weighing from 1-5g, whereas this volumetric method employs a 0.3-g sample. Even a 0.03-g sample, corresponding to a piece of paper the size of an ordinary postage stamp yields fair results. The advantages of a method capable of precision with such small samples are important, since often only small test specimens are available, according to the Standards Bureau.

Will Stop Using Word "Maker"

[From our regular correspondent]

Washington, D. C., March 10, 1937—Jacob Glekel and Jacob Press trading as the Eagle Corrugated Products Company, New York, have entered into a stipulation with the Federal Trade Commission by which they will stop using as a brand for their corrugated fiber boxes the word "maker" or any other words of equivalent meaning, which tend to convey to customers the belief that Messrs. Glekel and Press are the manufacturers of their products or that they own or operate a factory in which the boxes they sell are made, when such is not a fact. The boxes in question, the stipulation sets out, were stamped with a brand which included the words "Certificate of Box Maker."

Delaware Valley TAPPI to Meet

The Delaware Valley Section of the Technical Association of the Pulp and Paper Industry will meet at the Engineers Club, Philadelphia, Friday evening, March 19th at 6:30 p. m. Dr. E. O. Kraemer of E. E. duPont de Nemours Company, Wilmington, Del., will talk on "Molecular Structure of Cellulose and Its Significance for the Paper Industry"

The Cause and Cure of Grainy Edges, Curl And Cockles in Paper*

By E. W. G. Cooper[1]

Abstract

A review of the defects that are of more frequent occurrence as indicated from complaint statistics, some of which may be traced back to variables in the pulp mill, beater room, or machine room.

Papermaking Fibers

I believe it is very necessary to have some knowledge of the chemical character of our raw materials, and of the chemical changes they are subject to during various conditions of treatment. Also of equal importance is a knowledge of the physical characteristics of the paper-making fiber. Not only will this afford a better understanding of the digestion, bleaching, or other processing, but will decide your selection of a certain fiber, with a predetermined treatment for a desirable characteristic in your finished product. For instance, the printing qualities of paper suited for lithography will not be found in papers made from long fibered stock, rag, or wood cellulose, which would result in too much expansion of the fiber in the absorption of moisture and heavy inks peculiar to this method of printing.

The printer demands a pliable, hard sized, very smooth surface and compact formation; entire absence of any curl, fuzz, or cockle, and a sheet that will not expand or stretch to cause misregister during the application of anywhere from 14 to 24 separate colors, which the best quality of lithographic work requires for the finest productions. Therefore, the ideal fiber would be esparto, but where only a few colors are to be used soda pulp could be used with sulphite, about 50/50 furnish, and 10-20 per cent sulphite with the 80-90 per cent esparto for the better quality. In any case a paper of 100 per cent sulphite or some other long or broad fiber, would result in misregister, and in all probability curl. The sheet would be too rigid to conform to the stone or plate, both being used for litho work. Here again the paper may be all that the printer desires if using a litho stone, but if the same paper should be lithographed with the metal plates, it would give trouble. The paper would have to be still harder sized, as the metal plates do not absorb the moisture as the stone does.

Let us at this time briefly review the physical characteristics of our other paper-making fibers before we come to the defects of the finished product. The average length and breadth of some of our fibers are tabulated below:

Deciduous wood (aspen, poplar, and cottonwood)	1 . 22 mm.
Coniferous wood	2 . 56 mm.
Western hemlock	2 . 9 mm.
Western white fir	3 . 5 mm.

Note the following contrast in the Esparto grass fiber:

	Length in Millimeters	Diameter in Millimeters
Esparto	1.5	.012
Straw	1.5	.015
Linen	25.0	.020
Cotton	30.0	.025
Bamboo	4.0	.015
Jute	2.5	.022
Manila	7.0	.020
Adansonia	12.0	.020
Famie	150.0	.050

All the above fibers have their own peculiar characteristics, both chemical and physical.

The length of fiber has a considerable influence on formation, tear, tensile, fold, while high mullen and low porosity demand some degree of hydration and fibrillae. These qualities are maintained and controlled by the selection of the fiber and the treatment in the pulp and paper mill.

A very brief description of the above fibers would, I think, be in order:

The manufacture of pulp from eastern hemlock and western hemlock is a good example of fiber influence on pulp and paper quality. An analogous condition exists in the pulping of North American spruce and Norwegian spruce.

POPLAR

Aspen or poplar pulp produced by chemical treatment from deciduous woods felts very easily, and comes into the category of fillers, closing up the interstices of any sheet it may be blended with such as book, writing, envelope, hanging, off-set and litho and label papers. In cheaper grades of book we would resort to the use of groundwood. Cotton rags are the most suitable raw materials for high grade blotting, filter, body paper for parchmentizing, and anywhere bulk is important due to its chemical purity and physical characteristics, its sharp twist, wide lumen, and thin walls. Where price permits, of course, cotton with suitable beating to produce hydration is used in similar grades to those produced from linen, and it is usual to blend the two for standard grades of rag papers, A.D. and T.S. ledgers, legal-document, writing, diploma-stock and drawing.

LINEN

One hundred per cent linen is used for some papers, but it is very difficult to bring it to a uniform dispersion or to isolate while in suspension. It is also very difficult for linen to felt into a well closed sheet and then dry without cockles, but it is used in the production of condenser, tracing, carbon and typewriting tissues, and unbleached for cable insulating. Linen, due to its peculiar structure and characteristic nodes, which offer so much more resistance to cooking and beating is in this respect very similar to bamboo, but since fractional boiling and two-stage bleaching is becoming standard practice, these paper-making fibers are not so troublesome.

BAMBOO

My experience with bamboo is that it is not a good mixer and will not blend very well with spruce-sulphite when making bonds and writing. If it is treated alone and refined, or in other words jordaned with some cutting action, it is all right, but is better still if used alone.

ESPARTO

Esparto grass, you will note, is one of the smallest fibers we have. The esparto is very difficult to beat, but forms well on the paper machine blended with either cotton or wood—with free beating for bulky, feather-weight print-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

[1] Member TAPPI, Paper Maker, Crown Willamette Paper Company, Camas, Wash.

ing, off-set and litho, antique finished papers; medium beating for coated art papers, and water-finished book (imitation-art); and well beaten for supercalendered book, magazine, catalog, writing; changing the percentage of grass and wood for the desirable characteristics of the paper.

Two important characteristics are its favorable effect on retention of loading and that it takes a very high machine finish, sweat finish, or a water finish, without any blackening. This is in the case of water finish book, with 90 per cent grass and 10 per cent wood fiber, and therefore, being one of the smallest fibers we have affords a favorable condition for maximum retention.

Based on this fact, we have the reason for specifying fine groundwood, special grinding, and screening for groundwood book, rotogravure, and opaque catalog in this country, where the former fiber is not suitable to carry the loading and give the desired opacity.

Straw

Another fiber, but one which is seldom used 100 per cent except in boards, is straw, which bears a similar resemblance to esparto. Nevertheless straw has a very distinct utility of its own, being easily hydrated. It is used in combination with woods and rags, in light weight papers such as cigarette, typewriting and bible, to give "rattle," but it is of course, unsuited for soft, bulky, opaque papers.

Jute

Jute has a very broad fiber with irregular canals and walls, and possesses a peculiar characteristic tuft. The fiber is very difficult to disperse on the machine while in suspension, resulting in a very marked mottle as seen in stencil and tag boards, in which it is used to advantage.

Manila

Manila is considered one of our strongest fibers due to its length and its high capacity for hydration. Manila is seldom treated to obtain a good white pulp, and does not produce fibrillae in beating. It is used where formation and color are not as important as strength; for instance in abrasive papers, tag, boards, wrapping, and cable. Adansonia is in the same class as manila.

We will, I trust, agree that the fiber characteristic must contribute very largely to sheet characteristics, and must certainly influence formation, finish, bulk, softness, hardness, porosity, density, opacity, transparency, absorbency, tear, tensile, fold or snap, and will go a long way towards meeting, or not meeting the required specifications.

Pulp Preparation

The next important factor to be considered is the method of isolation of the cellulose or the yield of the cellulose from the ligneous matter of its original state by chemical digestion, either by acid or alkali. The acid process is represented the Ritter-Kelner or direct cook and the Mitscherlich or indirect cook, and in recent years certain modifications have been developed such as Chemipulp, indirect heating, and circulating systems. Alkaline processes includes the use of caustic soda and lime in the case of rags, grasses, bamboo and jute, and sodium sulphate with caustic soda for the kraft processes.

These recent developments in the various methods of cooking that claim to give increased strength, color and a more pliable fiber are still to a certain extent subject to the influence of the human element which will for some reason, at some time or other, decide on a quick cook, a higher temperature, a stronger acid, and these create variables on the paper making machine and necessitate a change in operation.

There can be, of course, many other factors contributing to inferior pulp quality. When bleaching cells are not completely empty before recharging, and where stock is emptied into large storage tanks with inefficient agitation; uniformity of chip size is a necessity, length being more important than width due to the fact that the cooking acid will penetrate twenty times as fast through the ends of the chip than through the sides. Moisture variation in chips will create a variable in pulp. Excess moisture necessitates longer cooking with an increase in sulphur consumption; for instance, chips with 45 to 50 per cent require 15 hours cooking time, and chips with only 20 per cent moisture require 10 to 12 hours. While this point may be debative, chips with varying moisture content would demand a different cooking procedure or curve. If mixed you would over-cook the chips with the lower moisture content; therefore, with these and many more factors, that time does not permit me to bring before you for consideration, will without doubt create variables in the pulp that contribute more or less to these measurable and immeasurable defects in our finished product.

Papermaking Variable

Intelligent operation of the paper machine is also very necessary in our effort to produce paper without defects, for which the pulp mill will take the credit. But, usually when there is something wrong, it is the paper machine that will get the "knock." Possibly it was made on "the other shift," but when you succeed in locating "the other shift," they have their well-worn alibi too; the beaterman must have dropped a beater of broke, or they forgot to put something in.

This "eternal triangle" stock, beaterman, and paper machine operator, is becoming a thing of the past in mills that have their schools of instruction for the "young blood," which is being absorbed in their organization. These instructions provide them with a reasonable knowledge of all branches of manufacturing processes, resulting in an elimination of past confusion and uncertainty, and a more intelligent understanding of the complete process from log to paper. Instead of being a "triangle" with its different angles functioning separately, we have a circle made up of many parts put together operating as a co-operative unit with well balanced responsibility. This may appear to be the talk of a dreamer, but those mills that have already adopted the policy of systematic instruction for their men, add prestige to their organization and win the confidence of their sales force by producing a better product as a direct result of this intelligent operation and control.

As a hypothetical instance, imagine we are in a certain mill, and we find one machine with a much lower mullen test than standard. The stock is, of course, satisfactory and the usual presumption is that there is something wrong with the machine or the operator of that machine. Sometimes we know it is, but why? Should not the normal running condition of any paper machine be consistent with and favorable to maintaining those desirable qualities that at times appear to be very fugitive. If the strength and density of stock delivered to the beaters and from the beaters to the jordans is uniform, and the transmission of power is consistently being supplied at a constant speed in revolutions per minute to the beaters and jordans, the stock discharged to the machine chest would be of such uniform quality that the machineman would soon lose his ability as such and running a paper machine would be entirely a mechanical proposition. Unfortunately, we do not obtain these ideal conditions, and there are wide fluctuations in the quality of the raw materials and the equipment

for their preparation. These fluctuations still exist, and we exist with them, because all of our skill is required to surmount these fluctuating factors.

Grainy Edges

Formation is a contributing factor to grainy edges. Whether handmade or machine made the edges form differently than the center. We can, in some cases, by a certain manipulation of slice, apron and flow racks rearrange the distribution and partially overcome the adverse influence of a poorly designed head box, and sometimes eliminate a light edge. Other times it is not so easy, due perhaps to the fact that stock is beaten to a lower freeness, or as the case may be to a higher freeness. Whatever this predetermined figure may be, it must, of necessity remain constant because of other desirable features. You will notice that the side to side flow set up by the shake motion creates more or less of a ripple parallel with the deckle. It may be a slight tremor or a heavy swell, according to the amplitude of shake, and freeness of stock, the spouting velocity of the suspension discharged from slice, the position of the fourdrinier whether running uphill or down-hill, or level. Where this ripple is allowed to develop I have seen it show up at the dandy with the edges apparently light and dry, but I have checked this basis weight and found it to be all right, even a little heavier in some cases, but with low mullen test, due of course to a different formation.

Other contributing factors to grainy edges could be aggravated by badly worn edges of wet felts, slack edges of drier felts, faulty crowned presses, induced draft effecting a too rapid drying of edges of sheet and contraction of same in the drier section. Therefore, the cure or cures for this particular defect, grainy edges, would be:

Correct any faulty distribution from the slice. A higher head retards shrinkage and results in wider trim.

If permissible use a short snappy shake, run the wire level or slightly up-hill.

If the sheet shows dry under dandy at edges, blank off that area of suction box just enough to bring the sheet wet or plastic for the dandy to function from deckle edge to deckle edge.

If your wet felts are threadbare, causing a pronounced felt impression and you do not find it convenient to put on new ones, take the weights off the presses and run machine slower, choosing the lesser evil.

You can by experience and with consideration of your local conditions select the most suitable crown to help eliminate this defect. First you must have sufficient crown to your first and second bottom presses to compensate for the deflection and weight of top roll, also enough to leave edges to your sheet with a little higher moisture content than the center, while the third press and the smoothing press (if you have one, if you have not, you will be well advised to get one for it will help) should be crowned only to compensate for top roll weight and its own deflection to give an even pressure edge to edge, which will contribute to even caliper and surface, presenting to the driers a sheet with a little more moisture on the edges so that when it reaches the calender stack it will have or should have a little more bulk. The stack will pinch the edges imparting a little more finish than you would otherwise have if the sheet was of a lower moisture content.

It is also advisable to hang curtains along the driers to retard air drying of these edges and contraction of the fibers. The lower the humidity the more aggravating these conditions become. Therefore, in large machine rooms housing several machines, some with natural draft, others with induced draft, some with and some without cross-current circulating systems (open doors and possibly windows) the quality of air in the machine room is continually changing, making it all the more necessary to close in driers with curtains, slow down draft fans and control the amount of air on both sides of the machine, run drier felts taut and maintain them as such because often they are wet. Felt driers are a good investment at any time. The weave of your drier felts contributes to the finish of your sheet. If you have a breaker stack in your drier section, use it; if you have a size press, when not sizing, change the rubber roll for steel and use as a breaker stack. Where using sweat rolls, have a jet of steam on the edge. This will cause fibers to expand and roll out smooth in the calendar stack.

Another good method for any fine grade where grain, felt or wire impressions are objectionable is to have your second press run in the reverse direction instead of the third, which in this case you would run straight through. Steam jets a few inches inside deckle straps will help by freeing sheet at the edges, increasing the drainage and will also increase the bulk, resulting in increased pressure from dandy roll.

Hard sulphite that offers undue resistance to beating and jordans, retaining its resiliency, will contribute towards grainy edges more so than a softer stock.

It has also been found advantageous to use warm water in the washing of the pulp. And for dilution at the beaters, and jordans, white water or the effluent from the save-all is usually of higher temperature than the fresh water supply and can be reused advantageously to reduce the usage of fresh water and materially help formation.

In conclusion, more efficient drying would to a large extent help to eliminate grainy edges. Where driers are more or less wide than the sheet, the edges will have a higher temperature than the center of the drier, and will cause undue shrinkage which produces a grainy edge. Humidity control of the air blown through the drier section will have a beneficial effect upon both edge and center drying, although if not controlled, fresh air of low humidity absorbs moisture from the edge of the sheet and retards proper drying in the center.

A demonstration of drying variables was obtained through my experience in Canada a few years ago. We were making "litho-label" on a combination machine with a standard press section. After the press section we had five 5-foot diameter driers in single deck followed with a 12-foot Yankee drier. After the Yankee there followed twelve 5-foot driers, calender stack, reel and winder. On the mezzanine floor over the five preheating driers we had another reel to handle the M. G. papers. When making M. F. paper, the sheet was passed under the drier into the next section. As I mentioned before, we were making our litho-label this way and giving it what we call English finish at the stack, and due to some unknown variable we had grainy edges. We also had some M. G. litho-poster to make at the time which permitted us to run out the stock on this order. As soon as we ran it over the Yankee drier, we then increased our width to four inches and eliminated the grainy edges. On the Yankee drier you have not the shrinkage as you have on the standard fourdrinier.

I believe this case emphasizes the importance of efficient drying. When two sheets of paper made from the same stock, with the same treatment on the wet end of machine, with everything except the drying being identically the same, have different qualities, then the importance of proper drying cannot be over-rated.

Curl

The next defect for your consideration is curl. There

is, of course more than one kind of curl. When we see paper stacked out in the finishing rooms or press rooms with the top sheets rolling up like lengths of stove pipe, this is curl. It may be the result of having been wound up on small diameter cores, or may be due to an uneven finish or moisture in the paper as it comes off the paper machine. Many paper manufacturers ship their product just as fast as they make it, others allow it to mature and ship from stock. While in stock the paper will have adjusted itself with the relative humidity of the stock room. This slow maturing might be too expensive for the No. 2 grades that usually only get a brief humidifying effect while stacked out in the finishing room. In the process of finishing, preparation for shipment, the edges of the stack or pile of sheets in the finishing room being the only portion exposed take up moisture from the humid atmosphere creating expansion, buckles, and wavy sheets.

Curl in paper, like curl in your hair, can be part of your make up, or created by some artificial means by the application of moisture or heat, and not so permanent as that curl which we bring into this world with us. How well we all know how true this is of our paper. It is the inherent curl that like a bad coin will always turn up, even after it has gotten by the inspector and has been shipped to the customer. It will turn up after it is unwrapped and we then get a complaint, but not always; sometimes they never mention it, but never order any more paper. This permanent or inherent curl usually is in the machine direction, and I believe is greatly influenced by sheet formation, type of slice, length of fiber, spouting velocity of stock, and the relative speed and pull of the machine wire. Also the per cent of loading in the sheet may have something to do with this. Its specific gravity with the combined quality of any hygroscopic material in a free sheet would also contribute to inherent curl, while the retention of filler in a free beaten sheet would, of course be low. That which is retained will be on the bottom side and the bleeding action of the vacuum boxes and rolls would not have the same effect on the bottom side as in the case of a well beaten sheet. The sheet with the loading on the bottom side would be a two-sided sheet, and one side would be more susceptible to moisture than the other; but in the case of a well beaten sheet and shorter fibers, you have a favorable condition for retention and a more homogeneous sheet, which goes a long way to prevent curl. Again, the latter would not be so conducive to a pronounced wire mark as the free sheet, which means more exposed surfaces to take up moisture and curl.

Formation makes its contribution to inherent curl, while fibre is still in suspension under the influence of the shake. It is the making of the sheet here that demands our attention. The crossing of the fibers before they are set on the wire is our objective, to avoid a two-sided structure that lends itself to curl. In spite of other influences present the smaller fiber finds its way to the bottom, and the type of slice we have in use, with a high head behind it, seems to me to control the fiber so that it will place itself on the wire as it is discharged from the slice orifice. The pond plates at each side, the apron board the length of apron retards its speed and tends to turn the fiber endwise. The bottom strata would naturally be moving faster than the top or surface of the head which moves forward at a slower rate and downward at the back of the slice until it gets through the orifice, while between the top and bottom there are other layers in similar horizontal planes moving at different speeds. We have only to put behind the slice the flow eveners, or flow racks, made up of thin copper sheet 24 x 24 inches spaced from 2 to ¾ inches apart. These plates change the edge currents and, coincident with each plate there is what the paper-maker calls a worm, the longer the fiber and freer the stock the more these worms appear to come, and the nearer you place these racks to the slice orifices the worse the worming condition becomes.

Without the use of these improvised flow eveners, we get these layers travelling at different speeds and trying to arrange themselves in the direction of the flow. First the flow is downward, on the bottom strata of the volume as it is discharged through the orifice of the slice onto and through the wire cloth. This condition changes, of course, with stock, freeness and temperature. This primary downward flow effects a fine layer or coating of fiber on the wire cloth that remains inert; it is there to stay and is not influenced by the shake. You can, however, by increasing the speed differential of stock and wire open up your formation so bad that you would change it without further consideration. The next and each succeeding layer can be influenced by the shake. Being still in a state of suspension, the longer you maintain your fiber in suspension, the longer it will be under the influence of the shake and become placed nearer to right angles with the machine direction, imparting cross machine direction strength as well as filling up any places in the sheet which would otherwise be deficient in fiber content.

The influence of the slice upon formation qualities is too lengthy a subject to discuss here, except what I feel is necessary because of its relation to the defect we are considering. We are, I trust, agreed that the fine fibers get to the bottom of the sheet and many of them go through the wire with the drainage into the save-all, and in order to control the retention of a loaded sheet, we have to control our rate of drainage by the most suitable method we know, consistent with meeting the required specifications. Therefore, if we can conceive of a slice that would present to the wire a stream that is as homogeneous as we would like our paper to be, we would not have a formation so conducive to curl, the small fiber which I believe to be in the majority at the bottom of the sheet are more easily dried. In the finished sheet they are much more susceptible to humid atmosphere, causing curl. In confirmation of this, I would like to say I have proved it to be true, at least to my own satisfaction, many times during the manufacture of Silurian writings, Grainite blottings, cheviot wrappings and cheviot bristol, where the use of 2 to 3 per cent colored fiber in the furnish is made. The wire side which is more easily discernible in the blotting because of a pronounced wire mark in a very free sheet, the colored fibers not only show the machine direction of the sheet, but the smallest fibers are also to be seen on the wire side and the majority of them are endwise. On the reverse side they are felted together more. In some instances the colored fiber is not passed through the jordan, therefore, there would not be any great difference in length noticeable, but the bottom side still shows the fiber lying lengthways in machine direction in contrast to the top side, and this two-sided structure brings forth inherent curl.

Had we a slice that could deliver the stock through an orifice under a uniform pressure not influenced by friction of pond plates, apron, or apron boards, we would have then, I believe, a suspension of fiber engaging with the wire at many different angles, without the tendency for strata laminations. While it is true, if the wire is not going a little slower than the spouting velocity of our stock, fiber would have a chance to straighten out, even so, it would not be so marked, as in the first case where the different strata of the stream are delivered to the wire at different speeds, the higher the head and the longer the wire, the more two-sided is our sheet structure. From our own experience we know that certain sheet formations contribute

definitely more or less to curl. When we retard the velocity to get mullen, we not only increase our cross tensile and the machine direction tear but we also decrease the tendency to curl, because we are making a sheet with a less two-sided structure.

In the production of sulphite envelope stock with the judicious use of mill broke or purchased broke (envelope cuttings and soda content, book or hanging) possibly with a little loading in the furnish, with favorable drying conditions and medium calendering, we should not find it difficult to produce a sheet that would lie flat. But in the manufacture of envelope from kraft it is not so easy. This grade usually requires good mullen strength. Stock is prepared in beaters and jordans accordingly, carefully avoiding any cutting action as we also desire good tear and folding qualities. Consequently we have a long and slow fiber with much of its original resilience—an ideal condition for curl. The only way to correct this condition, either completely or partially, would be to modify some, or all of the predetermined standards by the use of a little loading, or a colored pigment such as ochre, slight cutting action in jordans, sizing to be as low as permissible, and the use of as much mill kraft broke as we would maintain mullen and fold within the bounds of tolerance.

With favorable pressing and drying conditions, this sheet would not be as liable to curl as in the former condition. However, the writer believes that if the sheet is passed over cooling or sweat rolls you have a more even distribution of moisture and sheet is cooled, therefore, does not dry out in the reel. When it is cut into sheets or die cut into envelope patterns, its moisture content is more likely to be in equilibrium with the relative humidity of the mill cutter room or plant where it is to be converted. It would not have the same tendency to take up moisture and curl as would the paper reeled up hot with possibly a moisture of 7 per cent. Furthermore, whatever moisture, drying, or temperature control you may have, it does not correct the damp or overdry streaks from bad presses, bad felts, and poor circulation in the driers. With both intelligent use of sweat rolls and the employment of good moisture control some degree of uniformity may be obtained, but they are not cure-alls.

A heavily loaded sheet will be less likely to curl and soft sized papers do not curl as much as hard or medium sized papers will. The soft sized papers offer least resistance; it readily absorbs moisture through its entire bulk, while the sized and highly finished papers have one side that is more impervious to moisture than the other, otherwise it would not curl. For instance, on blottings or filter paper I do not recall having had any trouble with curl in their production. If we consider briefly our usual method of preparation of stock in the beater and the manipulation of the paper machine, it is just the contrast to that for glassine or greaseproof. Between these two extremes are: cutting and bruising action; low and high consistencies in beaters, jordans and machine head box: short and prolonged beating time; unsized, soft sized, and hard sized papers; and, low, medium and high finish sheets. Our consideration of these factors should serve as a guide in our search for the proper procedure and desirable characteristics in our paper.

M. G. papers are also worthy of mention in connection with curl. I have made these papers on different types of machines. Many European M. G. machines present the top side of the sheet to the larger drier. In this country many are running with the wire side presented to the large drier. I have noticed that both sheets have the tendency to curl towards the glazed side. I would suggest the reason for this is that the glazed side is sized harder than the reverse. This is more apparent when the M. G. sheet is not run through a stack of calenders as the custom is for some grades after leaving the drier. Also, in the case of tub sized papers, the curl is towards the side that has taken up most surface size; this also would apply to calender sized papers. Other causes of this defect or other contributing factors would be: high finished papers; unevenly finished; dried paper as in calender staining; and, water and steam-finished grades; also heavy weights, card stock, bristols, etc.

Tabulating stock wound tight on small diameter cores is one of the most exacting grades to make in card stock and one with many rigid specifications. Any kind of a curl would be objectionable. It must have a high and even finish on both sides, with even moisture, uniform caliper without variation, and possess a good snap. The test for curl is made by cutting a piece 3½ inches x 7⅜ inches placing it in an oven on a straight plate at a temperature of 120 deg. F. The sheet should stay flat and show no sign of curl or warping, and if your paper can take it like that you are not afraid to ship it. How is this done? The stock is beaten slowly, the roll is let down gradually, then raised up before beating cycle is complete and then the stock is brushed out and dropped at a freeness of 580 to 600 cc. (C. s.) Treatment in jordan is more after the order of refining, using a little water in the jordan to give a slight cutting action; using choke valve to build up a pressure to develop some degree of hydration and snap, rather than engaging plug with shell. The stock is sized with resin and alum with the addition of starch, silicate of soda, and paraffin wax. The temperature of the driers is graduated. It is water finished on both sides using two heavy stacks of nine rolls each, and between the stacks two pony driers are provided; steam heated and temperature controlled to correct any evidence of curl.

Tight draws between the wet end sections of the paper machine should be avoided. Wet drier felts and drier felts without felt driers are sometimes putting moisture in your sheet at the dry end. Sweat rolls used intelligently will help to correct this tendency to curl. Paper is often coming out of your drier section with dry and wet streaks, and after going through the fault finders, I mean your calender stack, the sheet is distorted. The wet streaks are rolled out and have become longer. This paper in rolls will register a complaint from the operating of the waxing machine or the printing press. If cut into sheets, these distorted areas are called curl. As for the operation of sweat rolls, I believe I mentioned before, as a help to cure your paper, whether they are standard brass sweat rolls or just improvised rolls such as the last two driers often used in the case of newsprint, they are more adaptable for all conditions if equipped with a brass steam pipe fitted with brass pet cocks spaced at 2 inch centers to impinge a jet of steam, if, as is the case in extreme circumstances, extra moisture is required, at a certain point. But usually the cold water inside the sweat roll, if you have a large enough outlet, is sufficient to counteract the uneven moisture content of your sheet.

Cockles

Cockles are more liable to occur where the stock is more or less hydrated, or where the beating is carried out over prolonged periods. Very often, the characteristics required in a particular sheet demand a longer beating period with a high degree of hydration. In cases such as this, some other means must be employed to cure the sheet of cockles.

It is usually the case with onion-skin, tracing, manifold, and base papers for carbon tissues that a tendency to cockle is very pronounced. This cockle is characteristic

of this grade, appearing all over; from edge to edge. Sometimes this is tolerated in some papers; like the deckle edge of hand-made paper. Instead of being a defect, it is considered a mark of quality and is often imitated in machine made papers as the inherent cockle of a rag tissue is imitated by a ripple board interleaved between the sheets in the same way as we produce a linen finish with the use of Irish linen.

Where cockle is objectionable, as in the case of tracing or other base tissues made from well hydrated stocks, and of course many others amongst the cheaper grades, one of the first things we think of today is the "cross-current circulating system," which I believe does help to correct one of the conditions conducive to cockling. I think it was back in 1923 that I had my first experience with this idea. We were making all rag carbon tissue and we found that this was not sufficient to cure the cockles. There could be no slackening off of the jordan because we had none. There was no correcting factor in that mill between the beaters and the machine. The beater man beat the stock just right for any particular grade we had to make. However, we could and did use a little steam in the stock to assist in drainage on the wire and at the presses, and, to present to the driers if not a drier sheet, a sheet with a little high temperature. We also had another way to take them out. Two brass cooling rolls were installed at the same location as the size press. These were fitted with internal water showers and impinged on the outside face were steam showers. Draws were slacked off to a point where the sheet would wrinkle very slightly to avoid undue tension in the machine direction. The dampened sheet came out wider as the fibers adjusted themselves to their original dimensions prior to the first stage of construction in the drier section. In the case of "pseudo" tub sizing, those of you that have had experience with this will have noticed that where there is a decided shrinkage in the sheet in the main section of driers after it has passed through the tub, the sheet becomes a little wider.

On papers where cockles only form on the edges, the same operating procedure as that described earlier for "Grainy Edges" should be applied. We should also be very sure that the edges of the sheet are not light, or that the addition of any fresh water from showers at the head box, screens, or under apron is not causing water currents on the wire. These will show up as light streaks and really are deficient in fiber. This condition will certainly cause cockles when presented to the driers.

Other causes for cockle can be traced to dirty and water logged streaks in the wet felts. A felt conditioner of a well known make would eliminate this source, as well as increase the life of your felts, and conditions would be more constant. The use of improvised means are not so beneficial to the life of your felts or its performance in maximum water removal. With wringer rolls, extra suction boxes, extra worm rolls, and usually an unlimited number of water showers, work together to increase the running time between the inevitable wash up. Felts undergo a continual rolling treatment of all their threads and fillings becoming flattened out, and soon get boardy. This condition is more pronounced in some parts of the felt than others contributing to the irregular moisture content so often evident in your sheet and also contributing to cockles.

A felt conditioner that will work on the individual threads of wool, as its cleaning or conditioning member travels across the felt, causing them to eject the dirt and allow wool to regain its original form and pliability and resilience to an almost new condition, will give you a very favorable condition to produce paper free from cockles so far as the press efficiency of your paper machine is concerned.

Other contributing factors are poorly ground press rolls that give an uneven nip, or rolls with excessive crown, misaligned couplings from drive to the bottom press journal, and core gears that bar the rubber rolls and cause them to ripple, being made much worse where you have no cross current circulating system. The back side of the machine being closed-in more than the front, more weight being carried on that side of your presses will cause rubber to creep and make the barring more intense; this will give you very irregular pressing, showing up in cockles, in streaks across the machine direction, and streaks that coincide with the cogs in your core gear.

Assuming that our press part is as efficient as we can have it, we should now give our driers more attention. Avoid sudden drying and extreme change of temperature; high moisture content, and very low temperature are bad for good drying. In cold weather, steam showers on press rolls and on press felts to warm up sheets will not only increase the efficiency of your presses but your drier section as well. Drier temperatures are usually graduated as paper becomes drier. Apart from any predetermined adjustments, I believe we should arrange to have a different quality of steam for the first section. For example: with a drier section of 48 driers the first eight and the last eight would be only furnished with the exhaust from the center section of 32, after it had been through the separator, of course. This is very beneficial for good sizing as well as a good precaution against cockles. We will find this condition much less conducive to cockles than bringing a sheet with 70 to 75 per cent moisture at a temperature of 60 deg. F., or less to a drier of 250 to 270 deg. F.

How much more serious this becomes when we have felts on our driers that do not absorb the moisture or allow the passage of vapor. Drier felts should be porous and have sufficient felt driers to give them the desirable capacity to take up moisture. Hot air in and around the felts in the machine basement or pits is a good help. A good porous felt will give you better contact and is more efficient in every way. You may be running the felt tight, but it will give you better service if porous. I can illustrate this from another instance of my own experience. A key fell out of a drier gear and drier was running around slowly; after it lost its momentum completely it stopped but did not break the sheet. How long this would or could continue I do not know, but this did continue for about five minutes when the paper broke on the press. Then the drier felt turned the dryer, but we could not get the sheet over. It would continually break down there, so we stopped and fixed it. The sheet and the drier felt had been riding on a film of vapor, but the point I wish to bring out is this: Unless you have a porous felt to pass out the vapor it will be trapped between the sheet and drier causing cockles and retarding your drying rate. Your sheet will lack the best finish it can get, and that is what it gets from contact of the driers and pressure of the drier felts. When it comes to the choice of a drier felt for the finer grades of paper where antique finish, eggshell or whatever term you may have for that dull, smooth surface, a woolen felt is the best you can get.

Cockles in M. G. Papers

Most of what has been said in relation to the cause of cockles on the fourdrinier machine could be applied to the M. G. machine too. In fact from my experience I would

feel inclined to say that while there would not be so much trouble from the stock, for we seldom have M. G. papers that call for a sufficiently high degree of hydration to produce inherent cockles. There are, of course, papers made on this type of machine that call for some degree of hydration, more or less, and the more it is hydrated the more trouble we are going to have to prevent cockles.

While it is very important to have the maximum efficiency in our press section on the fourdrinier, it is even more so on the M. G. machine.

Cockles take a different form or shape on the Yankee. Instead of being long they are circular. At times, the sheet puckers up into a well defined blister or cockle, and in extreme cases the sheet will lose contact with drier and ride on a film of vapor. The sheet is damp or wet and without finish. This is a very common occurrence as most M. G. machines are presenting the paper to the drier with a moisture content of 75 to 70 per cent, and to avoid cockle or pox spots and impaired finish you can only slow down and dry slower. Where convenient and necessary the use of pre-driers to bring your moisture content down to 60 per cent will increase your finish, production and will eliminate cockles.

An alternative is to have your drier bearings so constructed to provide a bearing surface at the top, so that it is possible for pressure roll to remove water at the point of contact with drier, and have a save-all provided to take care of water removed. Pressure can be applied by oil or hydraulic pistons to approximately 250 pounds per lineal inch, according to weight of drier. However you should have enough to take the weight of the drier and then some. Then you will have a very efficient nip pressure that would no doubt correct any irregularities from the press section, and it would be more economical to remove the moisture here by pressure than later on the drier by evaporation.

Oscillating doctors, water doctors, burnishing rolls on the drier, clean top and bottom felts, pH of stock, have more bearing on finish than cockles and will be considered later with other defects, fuzz, printability, pin holes, etc.

Developments in Paper Testing During 1935-36*

By B. W. Scribner[1]

Herein are mentioned briefly the more important published articles dealing with paper testing which have come to the writer's attention during the period October 24, 1935 to September 25, 1936. For detailed information the reader is referred to the publications listed.

Physical

J. d'A. Clark, chairman of the TAPPI Subcommittee on Physical Testing, proposed revisions of the TAPPI methods for bursting strength and tensile strength, and a method for stretch. The most important proposed departure from the usual procedure is application of the load at such rate that the rupture of the specimen occurs in a given time *(1)*. The proposed modifications were discussed by Griffin and McKinley *(2)*, and by Carson *(3)*. The proposed procedures and discussions of them also appeared in Tech. Asso. Papers *(4)*. O. Günther described a modified bursting strength tester which has exchangeable testing surfaces for Mullen measure and German measure *(5)*. The incline plane principle used in Scott tensile testers was discussed; greater accuracy and simplicity were claimed for this type of tester *(6)*.

Continued interest in permeability tests was displayed. Codwise reported the results of a TAPPI subcommittee investigation of the water absorption test suggested by Cobb, and recommended its adoption as a tentative TAPPI standard *(7)*. Brown and Harrison described a modified British model of the Currier instrument devised for measuring degree of sizing and reported it yielded test values that were consistently lower than those of the dry-indicator test *(8)*. Wosnessensky and Dubnikow investigated the effect of membrane-thickness, the character of the membrane, the temperature, and the vapor pressure upon the speed of diffusion of vapors through membranes *(9)*. Abrams and Brabender reported the results of an investigation of the factors affecting the determination of water vapor permeability, and proposed a testing procedure based on their findings *(10)*. Surface defects, relative smoothness, felt and wire side, direction of grain, etc., are said to be readily determined by a "fuzz detector" devised by the Hammermill Paper Co. *(11)*. Application of statistical methods to the determination of the folding endurance of paper was discussed by Carrier and Young *(12)*. The standard method of the Paper Makers' Association of Great Britain and Ireland for measuring thickness and bulk of paper was described *(13)*.

Optical

Important advances were made in the field of optical testing. Steele described the design, construction and calibration of a new type of instrument for measuring opacity *(14)*. Hunter reported the results of gloss investigations using reflected images of a target pattern, which he found to be a very useful means of studying gloss characteristics, particularly as the photographed images serve as permanent records *(15)*. Judd investigated the color of white papers and proposed reference standards based on visual gradings by 15 observers as compared with actual color measurements with magnesium oxide as a standard white *(16)*. Michaelson and Liebhafsky described an improved spectrophotometer designed by Hardy and adapted to industrial applications by the General Electric Co. *(17)*. Judd and Gibson called attention to the error in reflectance measurements caused by use of a cover glass when two diffusing surfaces, one light and one dark, are compared for apparent reflectance *(18)*. Wildeman discussed the possibilities of utilizing light reflection characteristics as a means of inspecting paper *(19)*. The results of an extensive investigation of determination of light-fastness, made by a committee of the Technical Section of the Papermakers' Assoc. of Gt. Britain and Ireland, were reported. They find the problem to be very difficult and state that among the complexities are: the necessity for a fading light of standardized spectral energy distribution similar to that of sunlight; the effects of atmospheric conditions, temperature, rela-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

[1] Chairman TAPPI Paper Testing Committee, Chief, Paper Section, National Bureau of Standards, Washington, D. C.

tive humidity and atmospheric impurities such as sulphur dioxide; the great differences in the manner of fading of different papers; the variation of the rate of fading with time when more than one dyestuff is used; the difference in fading of the same dye in different concentrations *(20)*. A "Rectron" lamp for testing light fastness was said to simulate sunlight but to be about 50 times as intense *(21)*. Louchart discussed the findings of the National Bureau of Standards relative to the use of a carbon arc lamp for testing light-fastness of lithographic ink pigments *(22)*.

Microscopy continued to receive considerable attention. Karsten gave an illustrated description of the new MeF universal camera-microscope, which can be used for dark field, polarized light and fluorescence investigations *(23)*. He also described several new types of photo-micrographic cameras *(24)*. Mukhopadhyay and Tampy report a method of differentiating between mechanical wood pulp, unbleached chemical pulp, and bleached pulp fibers. One part of the sample is treated with the Herzberg solution which stains mechanical wood pulp yellow and chemical pulp fibers pink, and another part with Cross and Bevan's ferric ferricyanide solution, which stains the mechanical wood pulp and unbleached chemical wood fibers deep green and blue, and leaves the bleached chemical pulp fibers colorless *(25)*. Goldsmid found the Kjeldahl method to be the most accurate of the several methods used for determination of wool in paper *(26)*. Graff discussed the essential qualifications and training of a microscopist for work in the pulp and paper industry *(27)*.

A further discussion of his work on fluorescence analysis of pulp and paper was contributed by Déribéré *(28)*.

Chemical

Acidity and pH measurements led the literature of chemical testing. Berndt discussed the various methods used for the purpose and the relation of pH to the strength and stability of paper *(29)*. Jackson and Parsons found the universal pH indicator of Yamada to be very useful in a pulp and paper mill where an accuracy of 0.5 to 1 pH is sufficient *(30)*. The nature and measurement of paper acidity were discussed by Browning and Ulm *(31)*. Graves stated that the glass electrode for pH values is superior to the other types as it can be used over almost the entire pH range and is unaffected by self-color or consistency of the medium *(32)*. Schwabe discussed the theoretical aspects of the colorimetric, catalytic and electrometric methods for pH, and stated that the glass electrode is the most suitable for pulp and paper work. He included a list of 39 references *(33)*. Cocking summarized the precautions necessary in colorimetric measurement of pH in unbuffered solutions. He stated that estimation of pH of water extract of paper by spotting it directly with indicator solutions may give results that are in error by several pH units *(34)*. The different kinds of glass electrodes and their possible application in the pulp and paper industry was discussed by Déribéré *(35)*. The various methods for determination of pH in the pulp and paper industry were discussed by Munds *(36)*.

Marini described analytical methods for detecting the impregnating and coating agents in paraffin, varnish, and bituminous papers.

P. F. Wehmer reported the developments of the TAPPI Subcommittee on Chemical Testing for the year 1935. Methods for zinc pigments, titanium pigments, iron, arsenic, and amount of mineral coating, were completed *(37)*.

General

In a discussion of the trend of paper testing, Campbell stated that testing tends to develop from an indefinite and overall character to the measurement of some definite characteristic of importance in the use requirements, notably in printing *(38)*. Wheelwright discussed the important properties of paper from the printer's viewpoint and described simple tests for evaluating them *(39)*. Korn, chairman of the German paper standardization committee, discussed the value of paper specifications and outlined the plans of the committee for development of standard testing methods *(40)*. The Central Grading Committee of the American Paper and Pulp Association reported studies carried out at the Institute of Paper Chemistry in connection with the committee's instrumentation program. Some instruments urgently needed for grading work were developed and progress was made in the evaluation of existing instruments *(41)*. Further details of these studies are contained in a report prepared for the committee by Kress and Morgan *(42)*. Mahler discussed this instrumentation program and stressed the need of critical evaluation of the present instruments *(43)*. He also discussed the benefits to be derived from grading and the necessity for a cooperative general program for development and classification of testing instruments *(44)*. Reviews of development in paper testing during 1935 were prepared, respectively, by Korn *(45)*, Sankey *(46)* and the writer *(47)*. The annual report of the activities of the TAPPI Paper Testing Committee showed progress in improvement of existing TAPPI standards and development of new ones, for physical, chemical, optical, and microscopic testings *(48)*.

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Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Machinery

Experiments Made During the Operation of a Welded Digester of 250 Cubic Meters Gross Content. E. Kostersitz. Papier-Fabr. 34, no. 26:229-234 (June 28, 1936).—This supplements a previous article by Danninger (no. 9:65-69 (March 1, 1936)). Data are given showing the strength properties, operating safety, resistance to acid and cost price of a welded digester as compared to the usual riveted type, all of which are in favor of the former.—C.J.W.

Rate of Delivery of Stock Through a High Pressure Inlet of an Imitation Parchment Machine. F. Haury. Papier-Fabr. 34, no. 26:240-245 (June 28, 1936).—Previous investigations have studied almost exclusively the rate of travel of newsprint stock in its relation to the rate of travel of the wire at the time when the suspension reaches the latter. The results showed that the velocity of the pulp-water mixture is lower at this point than that of the wire. Haury has investigated this relationship upon a machine making greaseproof papers, where conditions were expected to be different on account of the slow nature of the stock. In this particular case the velocity of the pulp was found to be higher than that of the wire, especially for the heavier grades of paper. The rate of flow was determined by measuring the quantities of the suspension delivered through the inlet and the width of the slice. The effects of the velocity upon sheet formation will be discussed in a later article.—C.J.W.

Paper Making Machine. Richard T. Lang, assignor to American Voith Contact Co., Inc. U. S. pat. 2,055,692 (Sept. 29, 1936).—The means for creating the shake are movably and adjustably arranged along a shake rail. Several identical shake devices can be used simultaneously at various points of the paper machine.—A.P.-C.

Toilet Paper Roll and Method of Forming the Same. Louis A. Straubel. U. S. Pats. 2,050,394 (Aug. 11, 1936) and 2,053,786 (Sept. 8, 1936).—In order to produce compactly wound rolls of toilet paper, series of transverse slits arranged in longitudinal rows corresponding in number and width to the number and width of individual rolls are formed in a wide sheet of paper. The latter is wound under tension, the roll is wrapped in a wrapper bearing suitable indicating marks, and the multiple roll thus produced is cut at the indicating mark to form individual wrapped rolls. *No. 2,050,394* covers the product and *2,053,786* the method of obtaining it.—A.P.-C.

Flat Screen. Clarence L. Durkee. U. S. pat. 2,054,968 (Sept. 22, 1936)—The reactive supports of the vibration-producing mechanism are associated with and made practically integral with the immediate structural support of the flexible bottom.—A.P.-C.

Corrugator. Walter J. Goettsch, assignor to Samuel M. Langston Co. U. S. pat. 2,051,296 (Aug. 18, 1936).—In a machine for the manufacture of single-faced corrugated paper in which the adhesive is applied in strips across the surface of the plain sheet, means are provided for adjusting the adhesive-applying mechanism relative to the corrugating rollers while the machine is running. This is effected by providing a rotatable roll having circumferentially spaced teeth meshing with those of the adhesive-applying roll and also having a driving connection with the adhesive-applying roll through the intermeshing teeth. This roll serves to force any excess of adhesive from between the teeth of the applying roll, and may also serve to transfer adhesive from a suitable source to the teeth of the applying roll.—A. P.-C.

What Are the Advantages and Disadvantages of Different Winter Systems for the Various Types of Paper, Such as the Pope Winder, the Electro Winder, and Old Systems with Belts and Friction Brakes? Papier-Fabr. 34, no. 29:273-275 (July 19, 1936).—Answers to a questionnaire can be summarized as follows: The Pope winder is the most suitable type for papers of 20 g./sq. m. and more, when the entire width of the paper web is wound in one roll. Great uniformity in the thickness of the web is essential or wrinkles are apt to be formed. This type can be used for high paper machine speeds and yields hard and uniformly wound rolls. The electro winder is best suited for more narrow rolls, when slitters are used to divide the paper web into several sections. It requires an electric drive and is also suitable for high speeds. It will yield uniform and hard rolls with very little waste. One of its main features is that it is almost independent of the human element. The old types of winders with friction brakes can be used for almost any type of paper running at lower speeds. They are useful when the paper has to be moistened for super-calendering and where soft rolls are required; their great disadvantage is their dependence upon the human element.—C.J.W.

Critical Discussion of Rifflers and Fine Screens with Special Reference to Erkensators. Papier-Fabr. 34, no. 28:265-270 (July 12, 1936).—This is a summary of answers received in reply to a questionnaire sent to members of the Austrian Section of the German Pulp and Paper Association. The main purpose was to determine whether erkensators would successfully replace rifflers and fine screens. The quite general opinion was that the erkensator can replace the riffler with satisfactory results, because in both cases heavier impurities are separated from the lighter fibers. In fine screening, however, fibers of diffrent sizes and tailings are eliminated. The erkensator, operating on the centrifugal principle, cannot perform that task and hence cannot be used for replacing the fine screens.—C.J.W.

Grinding of Paper Rolls. Eugen Schulte. Papier-Fabr. 34, no. 28:270-272 (July 12, 1936).—The correct selection of different types of grinding discs for crowning the various rolls in use in paper making is discussed. According to the material of construction of the roll, whether cast iron, bronze, copper, stone or rubber, suitable materials for the grinding discs must be chosen with appropriate bonding material, grain size and hardness degree.—C.J.W.

Theory of the Funnel-Shaped Save-All. H. Arledter. Papier-Fabr. 34, no. 24:185-191; no. 25:196-198 (June 14, 21, 1936).—The fundamental theories concerning the set-

tling process in funnel-shaped save-alls are described and illustrated by graphs. Special emphasis is placed upon the importance of selecting the correct size of equipment for the quantities of waste water to be handled. The results of the considerations are applied to save-alls according to the system Arledter and discussed from this viewpoint.—C.J.W.

Reliable Safety Coupling. Papier-Fabr. 34, no. 35:326-328 (Aug. 30, 1936).—Reference is made to safety couplings which are especially suitable for avoiding too abrupt starting of motors with a high number of r. p. m. or for preventing harmful overloads.—C.J.W.

Raw Materials

Some Relations Between Growth Conditions, Wood Structure and Pulping Quality. C. E Curran. PAPER TRADE J. 103, No. 11:36-40 (Sept. 10, 1936).—Analysis of spring wood, summer wood, compression wood, fast- and slow-growing wood showed that, except for compression wood (which shows higher lignin and lower total and alpha-cellulose), growth differences are generally not evidenced in chemical differences. Tests on the production of mechanical, sulphate and sulphite pulps from loblolly pine of different growth conditions, and determination of the properties of the pulps showed that differences in growth conditions may produce pulps as widely different in yield, strength properties and bleach requirements as would be obtained from unrelated species.—A.P.-C.

Wood Pulp for Rayon. IX. Chemical Constituents of the Woods Produced in Chosen. Masuzo Shikata, Akira Umemura, Itsuo Nishida and Nobukiyo Urano. J. Agr. Chem. Soc. Japan 12:626-628 (1936).—Analyses of the woods of *Picea excelsa* LK., *Picea jezoensis* Carr., *Abies nephrolepis* Max., *Pinus koraiensis* Sieb. et Zucc., *Larix dahurica* Turez., *Tilia amurensis* Rupr. and *Betula constata* Trautz., produced in Chosen, are tabulated.—A.P.-C.

Wood Pulp for Rayon. X. Manufacture of Rayon Pulp from the Hard Woods. Masuzo Shikata, Shinichi Honda, Itsuo Nishida and Megumi Saito. J. Agr. Chem. Soc. Japan 12:629-638 (1936).—The analysis of *Populus tremula* L. var. *villosa* Wesm., and *Betula japonica* Sieb. var. *tauschii* Winkl. produced in Hokkaido and Manchuria were, respectively: alcohol-benzene extract 2.11, 3.21 per cent; 1 per cent caustic soda extract 16.76, 17.16 per cent; hot-water extract 2.97, 2.09 per cent; cold-water extract 1.54, 1.94 per cent; total cellulose 77.47, 57.62 per cent; alpha-cellulose 43.77, 40.23 per cent; lignin 18.74, 18.84 per cent; pentosans 18.72, 26.09 per cent; mannan 0.05 per cent; galactan 1.00, 0.68 per cent; nitrogen 0.10, 0.10 per cent; ash 0.61, 0.45 per cent; methoxyl 5.64, 6.28 per cent. When the woods were digested at 165° C. for 1 to 2 hrs. by the soda process, a good pulp was obtained, suitable for use in rayon manufacture. The yield of pulp was over 45 per cent and the alpha-cellulose content of the pulp was over 88 per cent.—A.P.-C.

Sulphite Pulp from Lauan Wood. T. Okada and S. Nakashizuka. J. Cellulose Inst., Tokyo 12:109-111 (1936).—Although Lauan wood is from a deciduous tree it is rich in lignin (32 per cent) and resembles coniferous woods in composition. Unbleached pulp obtained by the sulphite process contains 80 per cent of alpha-cellulose and 92 per cent of total cellulose, but the fibers are shorter than those from conifers.—A.P.-C.

Pulp from the Manchurian Cotton Stem. I. Masuzo Shikata, Shichiro Fukuwateri and Kazuhiko Akagi. J. Agr. Chem. Soc. Japan 12:622-625 (1936).—Analysis of the Manchurian upland cotton stem showed: water 10.47 per cent, alcohol-benzene extract 3.31 per cent, 1 per cent caustic soda extract 25.87 per cent, hot-water extract, 7.75 per cent, cold-water extract 4.82 per cent, crude fiber 43.37 per cent, alpha-cellulose 31.46 per cent, beta-cellulose 1.37 per cent, gamma-cellulose 10.54 per cent, lignin 23.23 per cent, pentosans 21.66 per cent, galactan 1.03 per cent, methoxyl 5.32 per cent, nitrogen 0.86 per cent, ash 12.06 per cent, and calcium pectate 1.73 per cent. A good soda pulp was prepared from the cotton stem. A preliminary treatment of the stem with 1 per cent caustic soda or 4.7 per cent nitric acid gave better results. The pulp was obtained in 27 to 30 per cent yield and analyzed: ash 3.14 per cent, alpha-cellulose 90.97 per cent, beta-cellulose 2.11 per cent, gamma-cellulose 3.78 per cent, and pentosans 9.04 per cent.—A.P.-C.

Pacific TAPPI Discusses Alloy Steel and Iron

The Pacific Section of the Technical Association of the Pulp and Paper Industry met at Olympia, Wash., on March 2 to discuss "Alloy Steel and Iron in the Pulp and Paper Industry."

Preceding the discussion, Ralph Winship of the Columbia Steel Corporation presented a sound moving picture of the construction of the San Francisco-Oakland Bay Bridge.

A. G. Zima of the Research and Development Department of the International Nickel Company presented a paper on the subject of Alloy Steels and Cast Iron in the Pulp and Paper Industry. This paper dealt in the main with the practical application of the various nickel steels and alloy cast irons and created considerable interest among the seventy men who attended the meeting. Following his talk there was considerable discussion on this general subject. The chairman of the meeting was Earl G. Thompson, who led the discussion following.

Those Present

Following is a list of those who attended:

C. M. Anderson and William Anderson, Eagle Metals Company, 3628 E. Marginal Way, Seattle; Irving L. Angove, Rainier Pulp and Paper Company, Shelton; B. A. Bannan, Western Gear Works, Seattle; J. Lobert Bell, Rainier Pulp and Paper Company, Shelton; Chas. H. Belvin, Chromium Corporation of America, Portland; Denis Berdine and John W. Bennett, Rainier Pulp and Paper Company, Shelton; W. E. Breitenbach, Grays Harbor Pulp and Paper Company, Hoquiam;

A. M. Cadigan, St. Regis Kraft Companay, Tacoma; N. W. Coster, Soundview Pulp Company, Everett; Henry V. Charnell, Jr., Olympic Forest Products Company, Port Angeles, Wash.; R. E. Chase, R. E. Chase and Company, Tacoma; Sidney M. Collier, Soundview Pulp Company, Everett; H. A. Des Marais, General Dyestuff Corporation, 333 Terminal Sales Building, Portland;

Fred Doherty, 601 Bellevue, Shelton; R. E. Drane, St. Helens Pulp and Paper Company, St. Helens, Ore.; Geo. E. Durkee, Shaffer Pulp Company, Tacoma; Conrad Dyar and Girard C. Eck, Rainier Pulp and Paper Company, Shelton; Harold T. Fretz, Olympic Forest Products Company, Port Angeles; N. O. Galteland, St. Regis Kraft Company, Tacoma; William R. Gibson, Shibley Company, Seattle; Harry W. Glenn, Crown Willamette Paper Company, Camas;

A. Gustin, Grays Harbor Pulp and Paper Company,

Hoquiam; S. E. Hazelquist, Weyerhaeuser Timber Company, Longview; Judson H. Holloway, Rainier Pulp and Paper Company, Shelton; Geo. W. Houk, Hooker Electrochemical Company, Tacoma; E. R. Johnson, 1023 Grand Avenue, Everett; Lester M. Johnson, Weyerhaeuser Timber Company, Longview; M. E. Kinsey, Rainier Pulp and Paper Company, Shelton; Ed. Magill and John C. Mannion, Grays Harbor Pulp and Paper Company, Hoquiam; W. J. McJannet, Eagle Brass Foundry Company, Seattle; D. C. Morris, James Brinkley Company, 417 9th Avenue South, Seattle; W. A. Morrow, Eagle Metals Company, 3628 East Marginal Way, Seattle;

Fred Nicholson, Stetson Ross Machine Company, Seattle; Adolf Orup, Soundview Pulp Company, Everett; F. M. Pape, 710 Belmont Place, Seattle; J. W. Peckham, Bristol Company, 5525 White Building, Seattle; H. L. Peterson, Longview-Weyerhaeuser Timber Company, Longview; Carl A. Ramstad, Soundview Pulp Company, Everett; H. H. Richmond, Electric Steel Foundry Company, Portland; Steve Rupert, Olympic Forest Products Company, Port Angeles;

J. M. Shedd, Everett Pulp and Paper Company, Everett; James T. Sheehy, Grays Harbor Pulp and Paper Company, Hoquiam; L. R. Sheldahl, Eagle Metals Company, Seattle; Fred Shaneman and Brian Shera, Pennsylvania Salt Manufacturing Company, Tacoma; T. M. Shields, Simonds Saw and Steel Company, Seattle; Geo. C. Shively, Soundview Pulp Company, Everett; Harlan Scott, Pacific Pulp and Paper Industry, Seattle; Winston Scott, Rainier Pulp and Paper Company, Shelton; Lloyd E. Stevenson, Weyerhaeuser Timber Company, Pulp Division, Longview; P. E. Sullivan, Ingersoll-Rand Company, Seattle;

Robert S. Tabke, Rainier Pulp and Paper Company, Shelton; R. I. Thieme, Soundview Pulp Company, Everett; Earl G. Thompson, Great Western Electro-Chemical Company, Seattle; H. A. Vernet, Staley Manufacturing Company, San Francisco, Cal.; R. O. Vognild, Hooker Electrochemical Company, Tacoma; H. F. Warren, R. E. Chase and Company, Tacoma Building, Tacoma; N. T. Widmann, Olympic Forest Products Company, Port Angeles; Elwood Wilson, Jr., Rainier Pulp and Paper Company, Shelton; Ralph Winship, Columbia Steel Company, 1054 4th South, Seattle; L. R. Wood, Grays Harbor Pulp and Paper Company, Hoquiam; E. H. Woodruff, Rainier Pulp and Paper Company, Shelton; Albert G. Zima, International Nickel Company, Inc., 705 Petroleum Securities Building, Los Angeles, Cal.; Peter N. Zopolis, Rainier Pulp and Paper Company, Shelton.

Lake States TAPPI Discusses Corrosion

About a hundred members attended the Lakes States Section of the Technical Association of the Pulp and Paper Industry meeting held at the Conway Hotel, Appleton, Wis., Tuesday March 9, 1937, at 6:30 p. m.

Chairman John R. Fanselow introduced the speaker, Dr. H. K. Ihrig of the Globe Steel Tubes Company , Milwaukee, Wis. Dr. Ihrig began his discussion of "The Means of Combating Corrosion" by pointing out the different types of corrosion. He stated that resistance to corrosion of many common metals was due to the formation of a protective coating and the problem of increasing corrosion resistance was essentially one of making this coating more tenacious. After a review of corrosion resistant alloys in general Dr. Ihrig briefly discussed Ihrigized iron and showed slides to demonstrate its properties. A general discussion followed.

Those Present

Emeran Ahles, Mosinee Paper Mills Company, Mosinee, Wis.; Paul Boronow, Valley Iron Works, Appleton, Wis.; Russel Brenzel, Thilmany Pulp and Paper Company, Kaukauna, Wis.; C. O. Bruden, Wallace & Tiernan Co., Madison, Wis.; M. A. Buchanan, Institute of Paper Chemistry, Appleton, Wis.; Martin Burke, Jr., Limestone Products Company, Menominee, Mich.

R. Chapman, Howard Smith Paper Mills, Ltd., Cornwall, Ont., Can.; C. J. Christiansen, Mathieson Alkali Works, Chicago, Ill.; Walter C. Christensen, Hoberg Paper Mills, Green Bay, Wis.; B. Cowan, Standard Oil Company, Appleton, Wis.; H. G. Cram, Appleton, Wis.; David DeZurik, DeZurik Shower Company, Sartell, Minn.; R. A. Diehm, Rohm & Haas Company, Appleton, Wis.; G. F. Enderlein, Mosinee Paper Mills, Mosinee, Wis.

W. P. Feeney, Appleton, Wis.; J. R. Fanselow, Kimberley-Clark Corporation, Neenah, Wis.; H. H. Gottsleben, Kimberley-Clark Corporation, Neenah, Wis.; J. H. Graff, Institute of Paper Chemistry, Appleton, Wis.; J. W. Grimes, Standard Oil Company, Neenah, Wis.; H. T. Holbrook, Wadhams Oil Company, Milwaukee, Wis.; J. F. Inderdohnen, The Bristol Company, Milwaukee, Wis.

Charles Johnson, Institute of Paper Chemistry, Appleton, Wis.; C. M. Johnson, Mosinee Paper Mills Company, Mosinee, Wis.; J. H. Johnson, Jr., Chemipulp Process, Wisconsin Rapids, Wis.; W. C. Johnson, Hoberg Paper Mills, Company, Green Bay, Wis.; A. D. Kirk, Standard Oil Company, La Crosse, Wis.; Gil. H. Krohn, Globe Steel Tubes Co., Milwaukee, Wis.; Stephen Kukolich, Neenah Paper Company, Neenah, Wis.; A. Lewenstein, Appleton Coated Paper Company, Appleton, Wis.

D. F. MacRae, Howard Smith Paper Mills, Ltd., Cornwall Division, Cornwall, Ont.; J. M. McAlear, Mason-Neilan Regulator Company, Chicago, Ill.; A. May, Thilmany Pulp and Paper Company, Kaukauna, Wis.; R. W. Meyer, Badger Paper Mills, Peshtigo, Wis.; G. D. Moore, J. D. Wilson Company, Milwaukee, Wis.; L. A. Moss, Institute of Paper Chemistry, Appleton, Wis.; R. L. Muriom, Badger Paper Mills, Peshtigo, Wis.; P. A. Paulson, Paulson & Wells, Appleton, Wis.; F. G. Pavlick, Mosinee Paper Mills Company, Mosinee, Wis.; A. Phillips, Consolidated Water Power and Paper Company, Appleton, Wis.; W. J. Plank, Jos. J. Plank and Company, Appleton, Wis.; I. F. Pohlmeyer, Globe Steel Tubes Company, Milwaukee, Wis.; William Prebbanow, Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis.

Robert Rusch, Institute of Paper Chemistry, Appleton, Wis.; W. H. Swanson, Kimberly-Clark Corporatoin, Neenah, Wis.; M. J. Taylor, Patten Paper Company, Appleton, Wis.; R. W. K. Ulm, Institute of Paper Chemistry, Appleton, Wis.; I. R. Valentine, Jr., Fox River Paper Company, Appleton, Wis.; E. H. Voigtman, Kimberly-Clark Corporation, Neenah, Wis.; J. E. Watson, Wisconsin Wire Works, Appleton, Wis.; E. R. Williams, Neenah Paper Company, Neenah, Wis.; Harold Woehler, Fox River Paper Company, Appleton, Wis.; R. J. Zaumeyer, Kimberly-Clark Corporation, Neenah, Wis.

Goulds Pumps Joins TAPPI

Goulds Pumps, Inc., Seneca Falls, N. Y., has become a member of the Technical Association of the Pulp and Paper Industry.

Beginning the manufacture of pumps in 1847, Goulds have since been furnishing pumps of all kinds for industrial services. While most of the earlier pumps were hand operated, many of the reciprocating, rotary and centrifugal types were steam engine driven, or belt or rope driven, as steam engine, or belt and rope, were practically the only types of drives in use at that time.

In 1887, fifty years ago, at about which time the "electric dynamo" as they were then called, began to be developed, Goulds saw the possibility of utilizing this new electric power unit as a prime mover for pumps, and developed a line of three-cylinder or "triplex" reciprocating pumps, this type being the only type suited for operation by electric motors or "dynamos."

Up to that time, pumping units consisted of either direct acting steam pumps, reciprocating single cylinder steam engine driven pumps, reciprocating pumps belt driven from steam engines or line shafts, and a few steam engine driven centrifugal or rotary pumps. Steam engine drive, or belt drive from water power were the only sources of power available at that time, as the direct current electric motor was not available until the late 80's and the steam turbine, and the alternating current electric motor were not in practical use, or available, until about the beginning of the present century.

The torque characteristics of the electric motor demanded a load which was not too variable, and because of this limitation, Goulds developed the triplex type of reciprocating pump to give a smoother load condition, because the single cylinder or two cylinder reciprocating pump gave a torque load so variable as to be unsuited to electric motors and would cause a pump to pound.

In 1887, the first triplex reciprocating pump was developed and was called Goulds Fig. 911 and 913, and was offered for paper mill service, to supply water to the boilers, and hydraulic pressure to the grinders.

In 1888, this was followed by Goulds Fig. 920, another triplex reciprocating pump for handling paper stock. The same year saw the development of Fig. 924 and 925 for paper mills where larger pumps were required for boiler feeding—grinder service, and stock pumping. All of the above pumps were offered for either belt drive, or for drive by the new electric motors.

The year 1890 saw the development of the ball valve for reciprocating pumps as applied to heavier paper stock, and also the development of the large reciprocating vacuum or exhaust pumps for use on the suction boxes of the paper machine. These pumps were known as Goulds Fig. 947 and 969.

Continuing the start obtained in those early years, Goulds have successfully improved the various types of reciprocating pumps, making new designs to adapt them to changing industrial demands, and developing in turn rotary and centrifugal pumps adaptable to new forms of driving units such as the alternating current motor, the steam turbine, gas, gasoline and Diesel engines, as they became available.

While the records of sales of Goulds pump to the pulp and paper industry, are available only back to the year 1890 (previous records are lost), it is interesting to note some of the paper mills which purchased pumps from the years 1890 to 1892. Many of these companies are no longer found in the paper mill directories, as they have since likely been absorbed by later companies, yet quite a number of mills who purchased Goulds pumps during the above years, are still active in the production of pulp, paper and paper products.

Among the companies who purchased pumps during 1890-1892 and still registered in the directory, are such names as American Wood Board Co., Dexter Sulphite Pulp & Paper Co., E. B. Eddy Paper Company, Globe Paper Mills, Glens Falls Paper Mills, Gould Paper Company, Harding Paper Co., Merrimac Paper Co., Tomahawk Paper Company, Victoria Paper Mills, and the Wisconsin River Pulp & Paper Company.

Other names from our early order book, which are not now found in the directory, and to mention only a few are: Bangor Pulp & Paper Co., Connecticut River Paper Co., Fall Mountain Paper Co., Hudson River Paper Co., Monroe Felt & Paper Co., Niagara Falls Paper Co., Remington Paper Co., etc.,

In all, 64 different paper companies' names appear on the list between 1890 and 1892, and of these only 20 are now listed in Lockwood's Paper Mill Directory, leaving 44 names which cannot now be found listed.

Situated in New York State, near the heart of the paper mill section, Goulds have been in intimate contact with the pulp and paper industry for half a century. New York State, together with its adjoining neighboring states of Pennsylvania, Connecticut, Massachusetts, Vermont and New Jersey, contain over 50 per cent of all the paper and pulp mills listed for the entire country, and as long as 50 years ago Goulds pumps were in operation in a large number of mills in all these states, and in addition to these, pumps were operating in other fields such as Michigan, Wisconsin, Maine and Canada.

The study of the pumping problems of paper mills, and the development of most suitable pumps to meet such problems, which was started by Goulds engineers 50 years ago, has been continued up to the present time. Just as new pumps were then developed in conjunction with paper mill engineers, to meet the problems of that time, later developments in paper making required newer designs of pumps to better meet the changing conditions, and Goulds continued their intimate contact with the paper industry and, by bringing out newer designs of pumps, kept pace with the industry.

To the line of reciprocating pumps developed in the late 80's and early 90's, was later added newer designs of reciprocating pumps for all services in the paper mills, followed by improved designs of the centrifugal type, superseding the earlier centrifugal "fan" pumps. As stock consistencies were increased, still newer types of centrifugal pumps with the warped vane type of impeller were developed, followed in more recent years by larger centrifugal types of pumps for stock agitation and circulating service, and still later by designs suitable for the newer bleaching systems, and black liquor recovery, until today Goulds line of pumps is so complete as to cover practically every pumping condition encountered in any branch of the pulp and paper industry.

Many of the newer paper mills built within the past few years, are equipped with Goulds pumps for every pumping service in the mill, such as general water supply—boiler feeding, condenser circulating, condensate, sump service, fire protection, grinders, white water acid, green and black liquors, bleached liquors, clay filters and stock pumps for all pumping, slushing, and circulating systems, from grinders or digesters on through the various stages of refinement to the paper machine.

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING MARCH 13, 1937

CIGARETTE PAPER

Max Spiegel & Sons Co., *Roma,* Genoa, 75 cs.; Standard Products Corp., *American Farmer,* Southampton, 24 cs.

WALL PAPER

F. J. Emmerich, *Hansa,* Hamburg, 10 bls.; ———, *Collamer,* Havre, 71 bls.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Farmer,* London, 45 bls., 5 cs.

NEWSPRINT

Perkins Goodwin & Co., *Hansa,* Hamburg, 61 rolls; Jay Madden Corp., *Hansa,* Bremen, 482 rolls; N. Y. Evening Journal, *Vingaren,* Norrkoping, 1434 rolls; Gilman Paper Co., *Vingaren,* Norrkoping, 639 rolls; Brooklyn Times, *Vingaren,* Noorkoping, 440 rolls; Jay Madden Corp., *Vingaren,* Hango, 276 rolls; Lunham & Reeve, Inc., *Vingaren,* Hango, 317 rolls; International Paper Co., *West Kyska,* St. Johns, 5621 rolls; International Paper Sales Co., Inc., *West Kyska,* St. Johns, 944 rolls; ———, *Stavangerfjord,* Oslo, 252 rolls; Perkins, Goodwin & Co., *Deutschland,* Hamburg, 288 rolls; Jay Madden Corp., *Deutschland,* Hamburg, 269 rolls; Jay Madden Corp., *Deutschland,* Bremen, 562 rolls.

PRINTING PAPER

W. Reimerdes, *Hansa,* Bremen, 47 rolls, 35 cs.; R. J. Saunders, Inc., *Queen Mary,* Southampton, 4 cs.; L. A. Consmiller, *Bremen,* Bremen, 1 cs.; ———, *American Farmer,* London, 14 rolls, 4 cs.; Steiner Paper Corp., *Edam,* Rotterdam, 6 cs.

WRAPPING PAPER

Rohner Gehrig & Co., *Hansa,* Bremen, 9 bls.; Standard Products Corp., *Konigstein,* Antwerp, 19 rolls, 4 cs.; Hieber Paper Co., *Konigstein,* Antwerp, 1 cs.; Guaranty Trust Co., *Deutschland,* Hamburg, 1136 rolls, 73 bls.

PACKING PAPER

A. J. Bullinger, *Black Tern,* Rotterdam, 15 cs.

DRAWING PAPER

C. Bruning Co., *Bremen,* Bremen, 9 cs.; H. Reeve Angel & Co., Inc., *Ascania,* London, 1 cs.

FILTER PAPER

C. Schleicher & Schull Co., Inc., *Hansa,* Hamburg, 25 cs.; J. Manheimer, *Queen Mary,* Southampton, 70 pkgs.; H. Reeve Angel & Co., Inc., *Queen Mary,* Southampton, 3 cs.; H. Reeve Angel & Co., Inc., *Ascania,* London, 12 cs., 2 ctns.; ———, *American Farmer,* London, 3 cs.

FILTER MASSE

A. W. Fenton, Inc., *Hansa,* Bremen, 100 bbls.; A. W. Fenton, Inc., *Deutschland,* Bremen, 100 bls.; J. Manheimer, *Bremen,* Bremen, 25 bls.

SURFACE COATED PAPER

Globe Shipping Co., *Hansa,* Hamburg, 25 cs., 74 crates; Globe Shipping Co., *Deutschland,* Hamburg, 62 cs., 83 crates; Hensel Bruckman & Lorbacher, *Bremen,* Bremen, 10 cs.; L. A. Consmiller, *Bremen,* Bremen, 5 cs.

METAL COATED PAPER

Taub Hummel & Schnall, *Hansa,* Hamburg, 2 cs.; K. Pauli Co., *Hansa,* Bremen 55 cs.; K. Pauli Co., *Deutschland,* Hamburg, 7 cs.; K. Pauli Co., *Deutschland,* Bremen, 38 cs.

COATED PAPER

W. J. Byrnes, *Queen Mary,* Southampton, 2 cs.

BASIC PAPER

Globe Shipping Co., *Bremen,* Bremen, 25 crates.

PHOTO PAPER

J. J. Gavin, *Queen Mary,* Southampton, 6 cs.

TRANSFER PICTURES

Rohner Gehrig & Co., *Bremen,* Bremen, 18 cs.

DECALCOMANIAS

L. A. Consmiller, *Hansa,* Hamburg, 11 cs.; Sellers Transportation Co., *Hansa,* Hamburg, 15 cs.; Sellers Transportation Co., *Bremen,* Bremen, 28 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Samaria,* Liverpool, 7 cs. (duplex).

TRANSPARENT PAPER

———, *Binnendyk,* Rotterdam, 5 cs.

GUMMED PAPER

Heemsoth Kerner Corp., *Bremen,* Bremen, 6 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., *Samaria,* Liverpool, 3 cs.; Meadows Wye & Co., *Samaria,* Liverpool, 1 cs.

ENVELOPES

H. Reeve Angel & Co., Inc., *Ascania,* London, 1 cs.

NOTE BOOKS

Keuffel & Esser Co., *Hansa,* Hamburg, 4 cs.

PAPER TUBES AND BOBBINS

———, *Deutschland,* Hamburg, 90 cs.

PAPER TUBES

———, *Hansa,* Hamburg, 133 pkgs.

STRAW BOARD

Balfour Guthrie & Co., *Edam,* Rotterdam, 1517 pkgs.; A. Vuyk, *Black Tern,* Rotterdam, 46 rolls.

MISCELLANEOUS PAPER

Keller Dorian Paper Co., *Excalibur,* Marseilles, 8 cs.; Jay Madden Corp., *Vingaren,* Hango, 19 bbls.; ———, *Stavangerfjord,* Oslo, 113 rolls; Japan Paper Co., *Belfast Maru,* Kobe, 6 cs.; Japan Paper Co., *Pr. Pierce,* Kobe, 24 cs.; Singer Manfg. Co., *Pr. Pierce,* Kobe, 17 cs.

RAGS, BAGGINGS, ETC.

E. J. Keller Co., Inc., *Barbarigo,* ———, 114 bls. paper stock; W. Stek & Co., *Barbarigo,* Leghorn, 35 bls. rags; Darmstadt Scott & Courtney, *Batory,* Gdynia, 194 bls. rags; Williamson Products Co., *Belfast Maru,* Shanghai, 100 bls. cotton waste; Royal Manfg. Co., *Belfast Maru,* Shanghai, 50 bls. cotton waste; Railway Supply & Manfg. Co., *Belfast Maru,* Shanghai, 100 bls. cotton waste; Michi-

gan Felt Co., *Belfast Maru,* Shanghai, 100 bls. cotton waste; ———, *Belfast Maru,* Kobe, 700 bls. cotton waste; R. Blank, *Cliffwood,* Copenhagen, 18 bls. rags; H. Hollander, *Cliffwood,* Copenhagen, 42 bls. rags; Banco Coml. Italiane Trust Co., *American Farmer,* London, 71 bls. rags; Manufacturers Trust Co., *Konigstein,* Antwerp, 28 bls. rags; D. M. Hicks, Inc., *Konigstein,* Antwerp, 113 bls. flax pulp; H. B. Franks, *Konigstein,* Antwerp, 221 bls. jute waste; ———, *Konigstein,* Antwerp, 109 bls. bagging; Irving Trust Co., *Konigstein,* Antwerp, 48 bls. bagging; E. J. Keller Co., Inc., *Konigstein,* ———, 11 bls. rags, 69 bls. bagging; E. Butterworth & Co., Inc, *American Importer,* Manchester, 121 bls rags; ———, *American Importer,* Manchester, 54 bls. bagging; Royal Manfg. Co., *American Importer,* Manchester, 66 bls. cotton waste; M. Snedeker Corp., *American Importer,* Belfast, 159 bls. paper stock; Guaranty Trust Co., *Edam,* Rotterdam, 6 bls. rags; R. & V. Miller, *Edam,* Rotterdam, 7 bls. rags; Loumar Textile By Products Co., *Black Tern,* Antwerp, 166 bls. bagging; R. & V. Miller, *Black Tern,* Antwerp, 41 bls. rags; Boger Cotton Products Co., *Black Tern,* Antwerp, 63 bls. cotton waste; R. Blank, *Black Tern,* Antwerp, 51 bls. rags; J. T. Lodge Co., *Black Tern,* Antwerp, 38 bls. rags; J. Eisenberg, *Black Tern,* Antwerp, 2 bls. rags; ———, *Black Tern,* Antwerp, 8 bls. rags; E. J. Keller Co., Inc., *Black Tern,* ———, 45 bls. bagging; Van Oppen & Co., *Black Tern,* Rotterdam, 21 bls. rags, 72 bls. paper stock; Great Eastern Packing & Paperstock Corp., *Black Tern,* Rotterdam, 139 bls. bagging; R. & V. Miller, *Black Tern,* Rotterdam, 8 bls. rags; Irving Trust Co., *Black Tern,* Rotterdam, 128 bls. bagging; D. Benedetto, Inc., *Black Tern,* Rotterdam, 99 bls. rags; Harris Goldman Co., *Black Tern,* Rotterdam, 59 bls. bagging; ———, *Deutschland,* Hamburg, 526 bls. cotton waste; E. J. Keller Co., Inc., *Deutschland,* ———, 167 bls. paper stock; E. J. Keller Co., Inc., *Laura C,* ———, 237 bls. paper stock; ———, *Hansa,* Hamburg, 112 bls. cotton waste; Van Oppen & Co., *Hansa,* Bremen, 58 bls. rags; Irving Trust Co., *Excalibur,* Alexandria, 55 bls. bagging; W. Steck & Co., *Excalibur,* Alexandria, 78 bls. rags; Castle & Overton, Inc., *Excalibur,* Alexandria, 53 bls. bagging; D. Benedetto, Inc., *Excalibur,* Alexandria, 26 bls. bagging; E. J. Keller Co., Inc., *Excalibur,* ———, 76 bls. paper stock; R. & V. Miller, *Bilderdyk,* Rotterdam, 34 bls. rags; ———, *Boston City,* Bristol, 62 bls. bagging, 67 bls. rags; R. Blank, *Binnendyk,* Rotterdam, 42 bls. rags; Herman Pack Co., *Binnendyk,* Rotterdam, 115 bls. bagging; Great Eastern Packing & Paperstock Corp., *Binnendyk,* Rotterdam, 51 bls. bagging; ———, *Samaria,* Liverpool, 95 bls. rags; ———, *Ascania,* London, 17 bls. rags; Castle & Overton, Inc., *Artigas,* Dundee, 166 bls. paper stock; ———, *Artigas,* Dundee, 58 bls. paper stock; ———, *Collamer,* Havre, 107 bls. cotton waste; D. Benedetto, Inc., *Collamer,* Havre, 123 bls. rags, 41 bls. bagging; Jacobson & Son, Inc., *Collamer,* Havre, 1 ble. rags; Chase National Bank, *Collamer,* Havre, 56 bls. dark cottons; H. Goldman Co., *Collamer,* Havre, 68 bls. bagging; P. Berlowitz, *Collamer,* Havre, 140 bls. rags; J. T. Flannery, *Collamer,* Havre, 31 bls. rags; R. Blank, *Collamer,* Havre, 469 bls. rags; Irving Trust Co., *Collamer,* Havre, 110 bls. bagging; J. Cohen & Sons Co., Inc., *Collamer,* Havre, 69 bls. rags; E. J. Keller Co., Inc., *Collamer,* ———, 85 bls. rags, 41 bls. new cuttings; J. Eisenberg Co., *Collamer,* Dunkirk, 19 bls. rags; Loumar Textile By Products, Inc., *Collamer,* Dunkirk, 82 bls. bagging; Van Oppen & Co., *Collamer,* Dunkirk, 79 bls. rags; Darmstadt Scott & Courtney, *Collamer,* Dunkirk, 22 bls. rags; H. R. Leshin Co., *Southern Cross,* Buenos Ayres, 130 bls. rags.

GLUE STOCK, ETC.

———, *Hansa,* Hamburg, 600 bags bone glue; ———, *Hansa,* Hamburg, 25 bags hide glue; L. & H. Lang, *Black Tern,* Rotterdam, 200 bags skin glue; G. van Gelder, *Black Tern,* Rotterdam, 40 bags skin glue; National Adhesives Co., *Deutschland,* Hamburg, 100 bags ground glue; ———, *Deutschland,* Hamburg, 200 bags bone glue.

OLD ROPE

Chase National Bank, *Boston City,* Bristol, 91 coils; W. Steck & Co., *Binnendyk,* Rotterdam, 83 coils; ———, *Artigas,* Leith, 69 coils; D. Benedetto, Inc., *Collamer,* Havre, 36 rolls; Banco Coml. Italiane Trust Co., *American Farmer, London,* 55 coils; Chase National Bank, *American Farmer,* London, 54 coils; Banco Coml. Italiane Trust Co., *American Importer,* Liverpool, 126 coils; E. J. Keller Co., Inc., *Barbarigo,* ———, 68 coils.

CASEIN

Irving Trust Co., *Toulouse,* Melbourne, 2000 bags; ———, *Deutschland,* Hamburg, 134 bags.

CHINA CLAY

———, *Samaria,* Liverpool, 125 bags.

WOOD PULP

Castle & Overton, Inc., *Hansa,* Hamburg, 2440 bls. wood pulp 488 tons; Bank of N. Y. Trust Co., *Hansa,* Hamburg, 545 bls. wood pulp 109 tons; M. Sone, *Laura,* Trieste, 1030 bls. wood pulp; Johaneson Wales & Sparre, Inc., *Vingaren,* Norrkoping, 2000 bls. sulphate; Castle & Overton, Inc., *Vingaren,* Hango, 3675 bls. sulphite; Lagerloef Trading Co., *Vingaren,* Hango, 1436 bls. sulphate Irving Trust Co., *Stavangerfjord,* Oslo, 150 bls. chemical pulp; Chase National Bank, *Stavangerfjord,* Oslo, 750 bals sulphite; Pagel Horton & Co., Inc., *Cliffwood,* Stockholm, 1000 bls. sulphite 203 tons; Castle & Overton, Inc., *Cliffwood, Hango,* 512 bls. sulphite 100 tons; A. Giese & Son, *Edam,* Rotterdam, 40 bls. wood pulp; ———, *Black Tern,* Rotterdam, 140 bls. wood pulp 28 tons; ———, *Black Tern,* Rotterdam, 400 bls. wood pulp 80 tons; Bank of The Manhattan Co., *Deutschland,* Hamburg, 866 bls. wood pulp 172 tons; Gottesman & Co., Inc., *Exminster,* Constanza, 1850 bls. wood pulp, 370 tons Bulkley Dunton Pulp Co., Inc., *Kersten Miles,* ———, 4500 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Dalhem,* ———, 2500 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Sagoporack,* ———, 600 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Argosy,* ———, 1625 bls. wood pulp.

WOOD PULP BOARDS

Flexideal Dry Mat Co., *Hansa,* Hamburg, 50 bls.; Flexideal Dry Mat Co., *Bremen,* Bremen, 44 bls.; Jay Madden Corp., *Vingaren,* Hango, 32 bls., 180 rolls; Jay Madden Corp., *Cliffwood,* Hango, 38 rolls, 24 bls.; ———, *Deutschland,* Hamburg, 251 bls.

PORTLAND IMPORTS

WEEK ENDING MARCH 13, 1937

Bulkley Dunton Pulp Co., Inc., *Stureholm,* ———, 2500 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Braheholm,* 6125 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING MARCH 13, 1937

M. Sone, *Laura C,* Trieste, 600 bls. wood pulp; N. Y. Trust Co., *Laura C.,* Trieste, 300 bls. wood pulp; Guaranty Trust Co., *Laura C.,* Trieste, 1990 bls. wood pulp; ———, *Laura C.,* Trieste, 300 bags bone glue; National City Bank, *Laura C.,* Naples, 68 bls. rags; ———, *Binnendyk,* Rotterdam, 61 bls. bagging; Eugen Boston, *Collamer,* Havre, 46 bls. picker waste; Ayres W. C. Jones Co., *Collamer,* Havre, 42 bls. cotton waste; ———, *Collamer,* Havre, 26 bls. new cuttings, 100 bls. bagging; G. M. Graves Co., Inc., *Collamer,* Havre, 193 bls. rags; Irving Trust Co., *Collamer,* Havre, 44 coils old rope, 34 bls. bagging; Darmstadt Scott & Courtney, *Collamer,* Havre, 16

(Continued on page 62)

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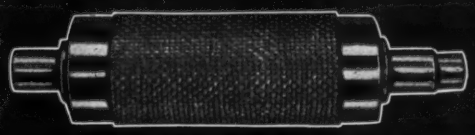

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I. Wallace Tower .....Member A.S.C.E., A.S.M.E.

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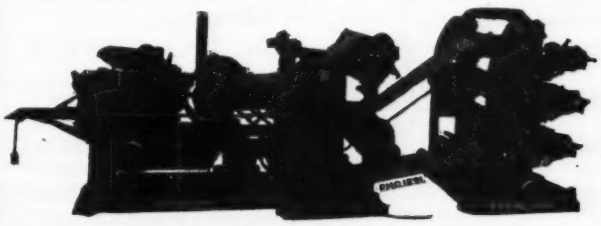

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MODEL 102—HIGH SPEED

NOTION BAG MACHINE

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, March 17, 1937.

Conditions in the local paper market continue to improve. Demand for the various standard grades of paper is insistent. Offerings are somewhat limited and some mills are experiencing difficulties in filling orders for immediate delivery. Prices are steady to firm.

The newsprint paper market is in a stronger position. During February the News Print Service Bureau reports the total North American production amounted to 375,714 tons, compared with 317,612 tons in the corresponding period last year. Stocks at the mills totalled 89,764 tons at the end of February.

Business in the fine paper market is brisk. Demand for book, cover, bond and ledger papers is well sustained. Prices are firm. Tissues are moving into consumption in good volume. The coarse paper market is displaying greater strength. Paper board prices have advanced.

Mechanical Pulp

The ground wood pulp market is exhibiting a stronger undertone than of late. Manufacturing operations in North America and abroad are proceeding in sufficient volume to take care of current requirements. Stocks at the pulp mills are not excessive. Prices are firmer.

Chemical Pulp

Quotations on imported chemical pulp have again advanced. Prime bleached sulphite is now quoted at from $2.90 to $4; easy bleaching sulphite at from $3.25 to $3.75; strong unbleached sulphite at from $3.25 to $3.50; all on dock, Atlanta, Gulf and West Coast ports.

Old Rope and Bagging

The old rope market is decidedly firmer, due to some extent to scarcity of supplies. Demand for domestic and imported old manila rope is quite active. Small mixed rope is moving freely. The bagging market is stronger. Both gunny and scrap bagging are showing improvement.

Rags

No radical changes transpired in the domestic rag market. Paper mill request for new and old cotton rags is about normal for the time of year. No. 1 white shirt cuttings are arousing some interest for domestic and export account. Roofing grades are fairly steady. The imported rag market is unchanged.

Waste Paper

The paper stock market is stronger than for some time past. Board mill demand for the lower grades is fairly heavy. Strictly folded news is now quoted at from .70 to .80 and No. 1 mixed paper at from .65 to .70, f.o.b. New York. The higher grades of waste paper are steady.

Twine

Steadiness prevails in the local twine market. Demand for the various varieties is holding up well and supplies are moving into consumption in good volume. The outlook for the future is considered promising, in most quarters. Prices are generally holding to schedule.

Imports of Paper and Paper Stock

(Continued from page 60)

bls. glue stock; ———, *Collamer,* Dunkirk, 2 cs. wrapping paper; Irving Trust Co., *Collamer,* Dunkirk, 100 bls. bagging; ———, *Collamer,* Dunkirk, 27 bls. new cuttings, 264 bls. paper stock; Atkinson Haserick & Co., *Barbarigo,* Genoa, 11 cs. paper; W. Garreston, *Belfast Maru,* Shanghai, 423 bls. rags; Royal Manfg. Co., *Belfast Maru,* Shanghai, 50 bls. cotton waste; E. Butterworth & Co., Inc., *Edam,* Rotterdam, 236 bls. picker waste; Balfour Guthrie & Co., *Edam,* Rotterdam, 212 bdls. straw board; Balfour Guthrie & Co., *Edam,* Rotterdam, 104 bls. wood pulp boards; Castle & Overton, Inc., *Edam,* Rotterdam, 250 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Hagen,* ———, 250 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Brahedolm,* ———, 750 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Argosy,* ———, 550 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *J. Christensen,* ———, 210 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Wisa,* ———, 150 bls. wood pulp; Bulkley Dunton Pulp Co., Inc., *Vito,* ———, 3725 bls. wood pulp; Parsons & Whittemore, Inc., *Idarwald,* ———, 500 bls. wood pulp.

Kilmory Book Paper Sales Agency

The Lehigh Valley Paper House Division of S. Walter, Inc., merchants of fine printing papers, with offices at 32-38 North Jordan street, Allentown, Pa., has taken over the sales agency for Kilmory Book Paper, manufactured by W. C. Hamilton & Sons, of Miquon, Pa.

James Flett Organization Moves

The James Flett Organization announce the removal of their Sew York offices to 220 East 42nd street, New York. Telephone anderbilt 3-7090.

River Raisin Votes Dividend

The River Raisin Paper Company has declared a dividend of 15 cents, payable March 24 to stockholders of record March 10.

PREPARE YOUR FILTERS FOR SPRING!

Eliminate flood water troubles by making necessary repairs or additions to your filters now. Put your water problems up to our engineers.

Norwood Engineering Co., Florence, Mass.

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Established 1882

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Dependable Service
Special Types to Meet Unusual Requirements

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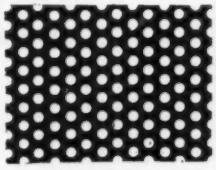

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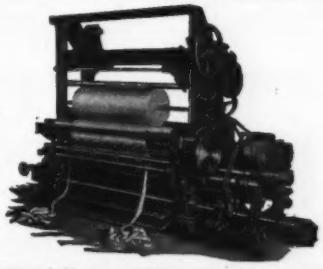
help reduce upkeep and labor costs in mill, finishing room or paper converting plant. Samuel M. Langston Company, Camden, N. J.



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Söderhamn, Sweden
CELLULOSEFABRIKS A.-G.
Bratislava, Czecho-Slovakia
SVANÖ AKTIEBOLAG
Svanö, Sweden

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, March 17, 1937.

BLANC FIXE.—Steadiness prevails in the blanc fixe market. Prices are holding to previously quoted levels. The pulp is quoted at from $42.50 to $45 per ton, in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—The position of the bleaching powder market is practically unchanged. Shipments against contract are moving in good volume. Prices continue steady. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN.—The casein market is easier. Domestic standard ground is now quoted at 17½ and finely ground at 18 cents; while Argentine standard ground is selling at 18½ and finely ground at 19 cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—No radical changes transpired in the caustic soda market. Prices are holding to schedule. Solid caustic soda is quoted at from $2.55 to $2.60; while the flake and ground are selling at from $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is displaying strength. Contract shipments are well up to average. Imported china clay is still quoted at from $15 to $21 per ton, ship side; while domestic paper making clay is selling at from $6.50 to $12 per ton, at works.

CHLORINE.—Supplies of chlorine are going forward to the paper mills freely. The contract movement is fairly heavy. Quotations are steady to firm and reports of shading are infrequent. Chlorine is selling at from $2.15 to $2.25 per 100 pounds, in tank cars, at works.

ROSIN.—The rosin market is fairly active. Paper making gum rosin is quoted at $9.45 and wood rosin at $9.35 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $4.25 per 100 pounds, in tank cars, at works.

SALT CAKE.—Offerings of salt cake are limited and the market is stronger. Salt cake is quoted at from $12 to $13; chrome salt cake at from $11 to $12 per ton, at works; while imported salt cake is selling at from $12 to $13 per ton, ship side.

SODA ASH.—The soda ash market is exhibiting a fairly strong undertone. Demand from the paper mills is brisk. Prices remain unchanged. Quotations on soda ash, in car lots, at works, per 100 pounds, are still as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—Business in the starch market is holding up well. Paper mill demand is satisfactory. Prices are generally holding to schedule. Special paper making starch is quoted at $4 per 100 pounds, in bags; and at $4.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—The sulphate of alumina market is quite active for the season. Prices are holding to schedule. Commercial grades are quoted at from $1.35 to $1.60; while iron free is selling at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR.—The sulphur market continues steady. Yearly contracts are quoted at $18 per long ton, on orders of 1,000 tons or over and $20 on smaller quantities. On spot and near by car loads, the quotation is $21 per ton. All quotations are in car lots, at works.

TALC.—Trading in the talc market is fairly persistent. The contract movement is normal. Prices remain unchanged. Domestic talc is quoted at from $15 to $18 per ton, at eastern mines; while imported talc is selling at from $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds		Ledgers
100% Rag Ext. No. 1	.36		.37
100% Rag	.29	@	.30
75% Rag	.22	@	.23
65% Rag	.19	@	.20
50% Rag	.15½	@	.16½
25% Rag	.13	@	.14

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds		Ledgers
No. 1 Sulphite	8.00	@	9.00
No. 2 Sulphite	7.00	@	8.00
No. 3 Sulphite	6.75	@	7.75
No. 4 Sulphite	6.50	@	7.50

Book, B Grade, Cased (f.o.b. mill less carload freight allowed)

S. & S. C.	6.00	@	—
S. & S. C. Litho	6.25	@	—
M. F.	5.75	@	—
No. 4 Coated and Enamel	7.00	@	—
No. 4 Coated Litho	7.00	@	—

Tissues—Per Ream—

White No. 1	.95	@	—
White No. 1 M. G.	.92½	@	—
White No. 1½	.67½	@	—
White No. 2	.62½	@	—
Anti-arnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.62½	@	—
Unbleached Toilet	2.60	@	3.30
Bleached Toilet	3.94	@	5.26

Paper Towels—

Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70

Manila—

No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00

Fibre Papers—

No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—

Roll, contract	42.50	@	—
Sheets	47.50	@	—

Kraft—

No. 1 Northern	5.25	@	5.75
Standard	5.00	@	—
Southern	5.00	@	—
Glazed	4.50	@	—
Striped	4.75	@	—

Boards, per ton—

News	47.50	@50.00
Chip	45.00	@47.50
Sgl. Mla. Ll. Chip	55.00	@60.00
Jute Lined Chip	55.00	@60.00
Kraft Liners	67.50	@70.00
White Pat. Coated	67.50	@70.00
Binders Boards	70.00	@75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—Moist	33.00	@35.00
Dry	33.00	@35.00
(Delivered)		
No. 1 Domestic and Canadian	33.00	@36.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—Prime Bleached Sulphite	2.90	@	4.00
Prime Qualities—Easy-Bleaching Sulphite	3.25	@	3.75
Strong Unbleached Sulphite	3.25	@	3.50

(On Dock, Atlantic Ports)

Kraft Bleached	3.50	@	3.75
Kraft Light & Strong	2.35	@	3.25
Kraft No. 1	2.25	@	3.10
Kraft No. 2	2.25	@	2.50
(F.o.b. Pulp Mill)			
Kraft Domestic	2.50	@	2.85
(Delivered)			
Soda Bleached	2.90	@	—

Add 60 cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—New White, No. 1	9.00	@	9.25
Silesias No. 1	6.75	@	7.00
New Unbleached	9.25	@	9.50
Blue Overall	7.00	@	7.25
Fancy	3.50	@	3.75
Washables	2.25	@	2.50
Mixed Khaki Cuttings	3.50	@	3.75
O. D. Khaki Cuttings	4.25	@	4.50

Old Rags

White, No. 1—Repacked	3.50	@	3.75
Miscellaneous	3.00	@	3.25
White No. 2—			
Repacked	2.50	@	2.75
Miscellaneous	2.00	@	2.25
Thirds and Blues—			
Repacked	2.00	@	2.25
Miscellaneous	1.90	@	2.00
Roofing Rags—			
No. 1	Nominal		
No. 2	1.85	@	1.90
No. 3 (bagging)	1.50	@	1.60
No. 4	1.50	@	1.60
No. 5A	1.40	@	1.50

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.50
New Mixed Cuttings	2.00	@	2.25
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxfords	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	2.25	@	2.50
French Blue Linens	3.50	@	4.00
German Blue Linens	2.50	@	2.75
German Blue Cottons	2.00	@	2.25
Checks and Blues	2.00	@	2.25
Linsey Garments	2.25	@	2.35
Dark Cottons	2.00	@	2.10
Old Shopperies	1.75	@	2.00
New Shopperies	1.75	@	2.00
French Blues	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—Foreign	2.25	@	2.35
Domestic	2.15	@	2.25
Wool Tares, light	1.75	@	1.85
Wool Tares, heavy	2.20	@	2.35
Bright Bagging	1.70	@	1.75
Manila Rope—Foreign	4.25	@	4.50
Domestic	3.75	@	4.00
Jute Strings	2.75	@	3.00
Sisal Strings	2.60	@	2.75
Mixed Strings	Nominal		

Old Waste Papers

(F. o. b. New York)

Shavings—White Envelope Cuttings	3.20	@	3.30
Ordinary Hard White No. 1	2.50	@	2.60
Hard White No. 2	2.20	@	2.30
Soft White No. 1	2.00	@	2.10
Flat Stock—Stitchless	1.25	@	1.30
Over issue Mag	1.25	@	1.30
Solid Flat Book	1.15	@	1.25
Crumpled No. 1	1.00	@	1.10
Ledger Stock	1.30	@	1.35
New B. B. Chips	.55	@	.60
Manila—New Env. Cut	2.15	@	2.25
New Cuttings	1.60	@	1.70
Old Kraft Machine—Compressed bales	1.70	@	1.80
News—No. 1 White News	1.40	@	1.50
Strictly Overissue	.70	@	.85
Strictly Folded	.70	@	.80
No. 1 Mixed Paper	.65	@	.70

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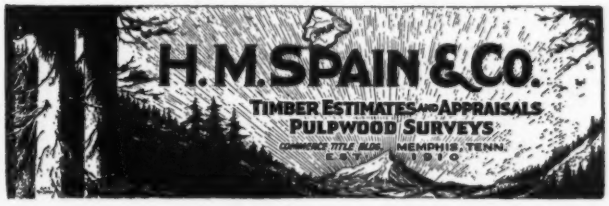

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Quickly and thoroughly removes all slime deposits from piping, wires, filters, equipment, etc.
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Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—			
India	.14¾	@	.17¼
Belg. White Hemp	.15¾	@	.19¾
India Compress	.15¼	@	.15¾
Fine Polished—			
Fine India	.21	@	.23
Unpolished—			
Box	.10¾	@	.11¾
Paper Makers	.10½	@	.12¾
Tube Rope	.11½	@	.14
Wall Paper	.12½	@	.13¾
Wrapping	.16	@	.20
Soft Fiber Rope	.13¾	@	.14¾
(Hard Fibre)			
Bond	.13½	@	.22
Anchor	.13	@	.14½
Manila	.21	@	.28

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M.F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.75	@	—
Coated Lithograph	6.75	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	42.50	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.08	@	.08½
New White, No. 2.	.04½	@	.05
Light Silesias	.05½	@	—
Silesias, No. 1	.04½	@	.05
Black Silesias, soft.	.03½	@	.04
New Unbleached	.06	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.07	@	.07½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.03	@	—
New Black Soft	.04	@	.04½
New Light Seconds	.03½	@	.04
New Dark Seconds	2.00	@	2.25
Khaki Cuttings—			
No. 1 O. D.	.04	@	.04½
No. 2 Mixed	.03¼	@	.04
Corduroy	.02	@	.02¼
New Canvas	.04	@	.04½
New Black Mixed	.02	@	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.20	@	2.25
Domestic No. 1	2.10	@	2.20
Domestic No. 2	1.90	@	2.00
Roofing bagging	1.75	@	1.85

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.75	@	—
Sisal Rope	2.25	@	2.35
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.25	@	2.50
No. 2	1.00	@	1.10
Wool Tares, heavy	3.25	@	3.50
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.20	@	2.25
No. 1 Soft White	2.00	@	2.10
No. 2 Soft White	1.40	@	1.45
No. 1 Mixed	—	@	.85
Solid Ledger Stock	—	@	1.75
Ledger Stock, white	1.60	@	1.65
Ledger Stock, colored	1.20	@	1.25
No. 1 Books, heavy	1.20	@	1.25
Manila Cuttings	1.80	@	1.90
Print Manila	.60	@	.65
Container Manila	.50	@	.55
Kraft Paper	—	@	1.40
No. 1 Mixed Paper	.50	@	.55
Straw Board Chip	.50	@	—
Binders Board Chip	.50	@	—
Corrugated Board	.65	@	.70
Overissue News	.75	@	.80
Old Newspapers	.60	@	.65

BOSTON

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.65	8.65
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.25	7.25
No. 4 Sulphite	6.50	7.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¼	@	.06¼
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.05¼	@	—
No. 2 Kraft	.05	@	—

(Delivered New England points)

Southern Kraft	.05	@	—
News Print Rolls	42.00	@	—
Straw Board, rolls	.009	@	35.00
Filled News Board	47.50	@	50.00
Chip Board	45.00	@	47.50
Single Manila Lined Chip	55.00	@	60.00
Single White, Patent Coated News Board (Bender)	67.50	@	75.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	70.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.20	@	2.35
No. 1 Soft White	1.85	@	2.15
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	1.35	@	—
No. 1 Books, light	.65	@	.75
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
Manila Env. Cuttings, extra quality	2.15	@	2.25
No. 1 Old Manila	.80	@	.85
White Blank News	1.25	@	1.30
No. 1 Kraft	1.90	@	2.00
Mixed Papers	.55	@	.60
Print Manila	.65	@	.75
Container Manilas	.27½	@	—
Old Newspapers	.60	@	.62½
Overissue News	.50	@	.65
Box Board Chips	.40	@	.45
Transmission Rope	2.00	@	2.25
Corrugated Boxes	.82½	@	—
Kraft corrugated boxes	1.50	@	1.60
Screening Wrappers	.60	@	.65

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	4.25	@	4.50
Domestic	3.00	@	3.30
Jute Rope	2.50	@	2.75
Soft Jute Strings	2.50	@	2.62½
Jute Carpet Threads	1.75	@	2.00
Gunny No. 1—			
Foreign	2.35	@	2.50
Domestic	2.10	@	2.20
Bleachery Burlap	4.25	@	4.50
Scrap Burlap—			
Foreign	2.15	@	2.25
Domestic	2.10	@	2.20
Scrap Sisal	2.50	@	2.60
Scrap Sisal for Shredding	2.75	@	2.90
Wool Tares, heavy	2.25	@	2.40
New Burlap Cuttings	2.85	@	3.00
Aust. Wool Pouches	2.90	@	3.00
Heavy Baling Bagging	2.40	@	2.75
Paper Mill Bagging	1.75	@	1.80
Bagging No. 2	1.70	@	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04	@	.04¼
New White No. 1	.09	@	.09¼
New White No. 2	.06¼	@	.07
Silesias No. 1	.07¾	@	.08
New Black Silesias	.04¼	@	.04½
Soft Unbleached	.09½	@	.09¾
Blue Cheviot	.07½	@	.07¾
Fancy	.03¾	@	.04
Washable	.03	@	.03¼
Cottons—According to grades—			
Blue Overalls	.07½	@	.07¾
New Black, soft	.04¼	@	.04½
Khaki Cuttings	.04¾	@	.05
O. D. Khaki	.05	@	.05¼
Corduroy	.03¼	@	.03½
New Canvas	.07¾	@	.08¼
B.V.D. Cuttings	.08¾	@	.09

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.00
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.70	@	1.80
No. 2	1.60	@	1.70
No. 3	1.30	@	1.35

Foreign Rags

(F. o. b. Boston)

Dark Cottons	2.20	@	2.30
New white shirt cuttings	6.75	@	7.50
Dutch Blues	3.00	@	3.15
New Checks and Blues	2.85	@	3.00
Old Fustians	2.85	@	3.00
Old Linsey Garments	2.65	@	2.90
New Silesias	6.50	@	7.00

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¼
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¼
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¾	@	.05¾
No. 1 Fibre	.04¾	@	.05¾
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¾	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.60	@	.70
Solid Books	.50	@	.60
Blanks	1.00	@	1.05
Krafts	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45
Old Newspapers—			
No. 1 Folded News	.42½	@	.45
No. 1 Mixed Paper	.25	@	.30
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	—
No. 1 Tints	.36½	@	—
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	.14½	@	—
No. 4 Tints	.15½	@	—
No. 5 Bond—White	.10¾	@	—
No. 5 Bond—Tints	.11¾	@	—
No. 5 Bond—Golden Rod	.12¾	@	—
No. 5 Ledger—White	.11¾	@	—
No. 5 Ledger—Tints	.12¾	@	—
No. 6 Bond—White	.10	@	—
No. 6 Bond—Tints	.10½	@	—
No. 6 Bond—Golden Rod	.12	@	—
No. 7 Bond—White	.08¾	@	—
No. 7 Bond—Tints	.08¾	@	—
No. 7 Bond—Golden Rod	.10¾	@	—
Book—			
No. 1 M. F.	6.50	@	6.75
No. 2 M. F.	6.25	@	6.50
No. 3 M. F.	5.00	@	5.35
No. 1 S. C.	7.00	@	7.50
No. 2 S. C.	6.50	@	7.00
No. 3 S. C.	5.50	@	6.00
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	4.80	@	—
No. 1 Manila	3.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—	
Rolls (contract)	Nominal
Sheets	Nominal

Pulp

Ground wood	29.00	@	30.00
Unbleached Sulphite	52.00	@	—
Book (Class 1)	64.00	@	—
Writing (Class 2)	65.00	@	—
Select (Class 3)	66.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.00	@	—
Light and Crumpled Book Stock	.90	@	—
Ledgers and Writings	1.10	@	—
Manilas—			
New Manila Cut	1.20	@	1.40
Printed Manilas	.55	@	—
Kraft	1.00	@	1.60
News and Soraps—			
Strictly Overissue	.65	@	—
Strictly Folded	.65	@	—
No. 1 Mixed Paper	.55	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09	@	.09¼
Fancy Shirt Cuttings	.03¾	@	.04